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Kimberly-Clark

**FINAL REPORT
PENN STEEL AREA
KIMBERLY-CLARK
CHESTER, PENNSYLVANIA**

Prepared for:

**Kimberly-Clark
Front & Avenue of the States
Chester, Pennsylvania 19013**

Prepared by:

**ATLANTIC
Environmental Consulting Services, L.L.C.
20 Cottonwood Lane
Warren, New Jersey 07059
(908) 755-2240
Fax (908) 755-2263**

December 2001

ATLANTIC

Environmental Consulting Services, L.L.C.

20 Cottonwood Lane
Warren, NJ 07059
(908) 755-2240
Fax (908) 755-2263

221 Pitman Avenue
Pitman, NJ 08071
(856) 218-8983
Fax (856) 218-7272

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Mr. Robert Fritz
PADEP
Lee Park, Suite 6010
555 North Lane
Conshohocken, Pennsylvania 19428

Re: Final Report and Site Management Plan
Penn Steel Area; Kimberly-Clark
Front and Avenue of the States; Chester, Pennsylvania

Dear Mr. Fritz:

At the request of Kimberly-Clark, Atlantic Environmental Consulting Services, L.L.C. (Atlantic) is submitting for your review and comment the enclosed Final Report and the Site Management Plan, respectively, for the Penn Steel Area of Kimberly-Clark's Chester, Pennsylvania facility. The Final Report documents the soil and groundwater investigation and remediation completed in the Penn Steel Area over the past 15 years and provides the data demonstrating attainment of the Act 2 Used Aquifer Medium Specific Concentrations for Groundwater in the Point of Compliance monitoring wells. The Site Management Plan was prepared for use in conjunction with the asphalt parking lot capping the Penn Steel Area (engineering control) in order to eliminate the potential for exposure to soil in the Penn Steel Area. Together, these documents support Kimberly-Clark's request for No Further Action in the Penn Steel Area.

If you have any questions regarding the report, please telephone me at 856-218-8983 or Mr. Gary Baker of Kimberly-Clark at 610-499-6355.

Respectfully,

Stan H. Carpenter

Stan H. Carpenter, P.G.
Senior Hydrogeologist

cc: Mr. Gary Baker - Kimberly-Clark
Dr. Thomas Hundt - Atlantic

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1.0 INTRODUCTION

1.1 Purpose of Report

Kimberly-Clark retained Atlantic Environmental Consulting Services, L.L.C. (Atlantic) to prepare this Final Report summarizing the investigation and remediation activities completed in the Penn Steel Area of Kimberly-Clark's paper mill facility located at the intersection of Front and Penn Streets in Chester, Pennsylvania (the site). A site location map is presented in Figure 1. The purpose of this Final Report is to document the attainment of the Land Recycling and Environmental Remediation Standards Act (Act 2) medium specific concentrations (MSCs) and to summarize the data that support Kimberly-Clark's request for No Further Action (NFA) in the Penn Steel Area.

The Penn Steel Area of Kimberly-Clark's Chester, Pennsylvania facility was formerly operated as a steel casting facility. The Penn Steel Casting and Machine Company (Penn Steel) vacated the approximately 14-acre site in the 1960's. In 1971, Kimberly-Clark (formerly Scott Paper) acquired the parcel of land and voluntarily undertook what was, in effect, a Brownfields initiative (over 20 years prior to Act 2) in order to return this once abandoned industrial property into a functioning portion of its Chester facility. In the 1970's, Kimberly-Clark developed the site as a paved parking area for tractor trailers that stored finished goods prior to off-site shipment.

In the mid 1980's, Kimberly-Clark began development of the eastern portion of the Penn Steel Area for use as a coal storage and handling yard. The coal yard was established to support operation of a co-generation plant in the main portion of the paper mill, which is located on the opposite side of Chester Creek. During construction of the planned coal storage yard structures, residual separate-phase product (presumably released to the environment by others prior to Kimberly-Clark's ownership and operation of the property) was encountered in the subsurface within the footprint of the former steel foundry operations. In 1985, in response to the detection of residual separate-phase product in the subsurface, Kimberly-Clark voluntarily initiated environmental activities in the Penn Steel Area in cooperation with the Pennsylvania Department

of Environmental Protection (PADEP) and in accordance with the prevailing PADEP regulations and guidance.

Kimberly-Clark completed the majority of the site work between 1985 and 1995, prior to PADEP issuing the draft Act 2. Subsequent to 1995, the site activities have been completed consistent with the concepts and evaluative methods described in the December 1997 final draft version of PADEP's Technical Guidance Manual for Act 2 (TGM). In 1996, in response to the pending Act 2 regulations, Kimberly-Clark developed a proposed action plan to bring the Penn Steel Area to closure with consideration of the Act 2 guidance. This report, *Final Proposed Action Plan*, was prepared by Asea, Brown, and Boveri (ABB) and submitted to PADEP in May 1996. The action plan recommended collecting additional groundwater samples, instituting a Site Management Plan, and evaluating the technical practicability and feasibility of recovering the limited thickness of residual separate-phase product dispersed in pockets of the site.

PADEP has not provided comments to the *Final Proposed Action Plan* in the over five-year interim period since submission by Kimberly-Clark. Given that the site activities were initiated in 1985, ten years prior to publishing of Act 2, Kimberly-Clark has not executed a Notice of Intent to Remediate (NIR) or formally entered into the Act 2 process for the site. Subsequent to submission of the *Final Proposed Action Plan*, Kimberly-Clark has continued to proactively move forward with the site activities and develop the data necessary to demonstrate attainment of the Act 2 standards. As such, Kimberly-Clark requests site closure outside the Act 2 process.

1.2 Report Organization

This Final Report consists of the following chapters. Chapter 1.0 provides the Introduction. Site background is detailed in Chapter 2.0. A summary of the extensive site investigations completed over the last 16 years is provided in Chapter 3.0. Site characterization information is outlined in Chapter 4.0. A discussion of the site ecological setting and screening is set forth in Chapter 5.0. Interim remedial measures completed in the Penn Steel Area and the technical impracticability of full-scale operation of a remedial system are outlined in Chapter 6.0. Chapter 7.0 documents

attainment of the MSCs for groundwater and the pathway elimination to soil exposure through the asphalt cap and gravel covering the Penn Steel Area. Fate and transport considerations are discussed in Chapter 8.0. An overview of the post-remediation care is provided in Chapter 9.0, and references are cited in Chapter 10.0.

2.0 SITE BACKGROUND

2.1 Site Description and Surrounding Land Use

Kimberly-Clark operates a non-integrated paper mill at Front and Avenue of the States in Chester, Delaware County, Pennsylvania. The property is situated between the recently upgraded portion of State Highway Route 291 and the Delaware River, just east of Front Street. The mill manufactures sanitary paper products (consumer products) including, paper towels, toilet tissue, facial tissue and napkins. The main property encompasses approximately 70 acres consisting of a number of buildings, which house plant offices, process areas, final product storage and distribution areas, and a co-generation plant (power plant). The approximately 14-acre Penn Steel Area is located southwest of and is separated from the main facility by the Chester Creek.

As shown on Figure 2, the Penn Steel Area is bounded by Chester Creek on the east, the Delaware River to the south, freight line railroad tracks and Front Street to the north, and industrial property on the west. The western portion of the Penn Steel Area is used as a paved parking area for tractor trailers that store finished goods prior to off-site shipment. The eastern side of the Penn Steel Area is used for coal storage and handling operations that support the co-generation plant located on the opposite side of Chester Creek. Conveyors that extend high above Chester Creek link the coal yard and the co-generation plant. Kimberly-Clark leases the eastern portion of the Penn Steel Area from the City of Chester and maintains the option to purchase the property or extend the lease through 2085.

The majority of the flat-lying surface in the Penn Steel Area is capped with asphalt. The remaining areas are covered with coal piles, buildings, coal handling or sorting structures, or trap rock. A fringe buffer zone of small trees and overgrowth lies between the fenced portion of the Penn Steel Area and Chester Creek and the Delaware River. A 24-hour guard service mans the only entrance to the Penn Steel Area, which is surrounded by a chain link, razor wire-topped fence. Access to the site is limited to employees, truck drivers and contractors.

maintained its native position into the late 1800's (Hughes, 1856 and Hopkins, 1870). Between 1885 and 1917, the historical tidal marsh area previously bordering the confluence of Chester Creek and the Delaware River was successively filled in order to expand the waterfront property toward the current bulkhead line (Sanborn 1885, 1898, and 1917). As discussed in Section 2.3, borings completed at the site confirm the presence of a fill layer overlying the clayey, organic-rich "meadow mat" deposits of the historical tidal marsh area.

The property development and use history mirrors the waterfront fill timeline. Available records indicate that a saw mill and coal yard operated on the northwest corner of the property (in the area located above the historical high water line) until the late 1880's (Hughes, 1856, Hopkins, 1870, and Sanborn, 1885). The City of Chester Directory (1895) and Sanborn Fire Insurance Rate Maps (1898) indicate that the main foundry of the Penn Steel Casting and Machine Company was constructed on and covered essentially the entire western portion of the site, between Penn and Concord Streets, in the early 1890's. The portion of the site situated east of Penn Street was filled and developed in the early 1900's. The eastern parcel contained accessory buildings to the Penn Steel operations and a boat maintenance and repair shop on the land currently owned by the City of Chester. A pictorial showing the layout of the Penn Steel facility in 1913 is provided in Appendix A.

The Penn Steel operations appear to have maintained the same buildings and operations into the 1950's (Sanborn, 1953 and USDA, 1963). As shown on the Sanborn map dated 1953, the Penn Steel foundry "Power House", which contained a boiler room and an engine room, was formerly operated near the present location of site monitoring wells MW-5RR, MW-6, and MW-7. The location of the Power House is consistent with the area of greatest measured thickness of residual separate-phase product. In addition, an aboveground storage tank used for fuel storage was identified on historical site plans near the current location of monitoring well MW-12. The eastern side of the site appeared to be vacant subsequent to the 1950's (Sanborn, 1953).

Based on conversations with the City of Chester Fire Department, the Penn Steel operations were discontinued in the 1960's (Maysky, 2001). The vacant Penn Steel facility caught fire in late 1960's

and again in 1970. The majority of the Penn Steel buildings were damaged or destroyed by the fire. Based on property registration records available in the City of Chester offices, Scott Paper acquired the western portion of the site in 1971. The City of Chester also took ownership of the eastern parcel adjacent to the Chester Creek in 1971. Kimberly-Clark entered into a 100-year lease agreement (with and option to buy) for the eastern portion of the Penn Steel Area with the City of Chester in 1985.

Aerial photographs provided in Appendix B indicate that the property owned by Scott Paper (now Kimberly-Clark) was paved and used for tractor trailer parking by 1980 (USDA, 1980). In 1980, the eastern portion of the site appears to be undeveloped and overgrown. Construction of the coal storage and handling yard used to support the co-generation facility (located across Chester Creek from the Penn Steel Area) was initiated in the mid-1980's. The coal storage, grinding, sorting, and handling towers and conveyors (and the ancillary stormwater runoff basins) were constructed in their current positions on the eastern portion of the property by 1992 (USDA, 1992). The western portion of the site continues to be used for tractor trailer parking and storage of finished goods.

2.3 Topography

The topography at the site slopes gently from the north and west, along Front Street, to the south and east, adjacent to the Delaware River. Elevations range from approximately 15 feet above mean sea level (amsl) adjacent to the railroad tracks that parallel Front Street to approximately 9 feet amsl along the fence line bounding the Delaware River bulkhead (Vargo, 1998).

2.4 Geology

The Kimberly-Clark facility is located on the western edge of the Coastal Plain Physiographic Province of Pennsylvania. The Soil Survey for Chester and Delaware Counties, Pennsylvania (USDA, 1963) indicates that the uppermost material underlying the asphalt and gravel surface covering in the Penn Steel Area is "made land". The heterogeneous fill material consists of slag, coal, cinders, foundry sand, brick, and wood in a sand and gravel matrix emplaced and compacted to build up the waterfront and provide structural stability for slab-grade buildings constructed on the previously low-lying areas. As shown in Appendix C, geologic cross sections developed from geotechnical borings (Malcolm Pirnie,

1971) and environmental soil borings (ABB, 1996) completed in the Penn Steel Area confirm the USDA interpretation of the "made land" and the historical documents (Appendix A) that indicate the Penn Steel Area was extensively filled.

As shown in Appendix C, the fill material thickness ranges from approximately 5 feet in the northwest corner of the site to feet to approximately 14 feet in the southeast corner of the site, near the confluence of Chester Creek and the Delaware River. The fill material overlies an organic-rich marsh deposit or "meadow mat" which, in turn, overlies Quaternary age deposits of the Trenton Gravel. The Pennsylvania Geologic Survey describes the Trenton Gravel as "gray or pale-reddish brown, very gravelly unit interstratified with cross bedded and clay-silt beds" (Berg, 1980). As shown in the cross-sections provided in Appendix C, the wedge-shaped sand and gravel deposits are thickest (approximately 20 feet) near the Delaware River.

In the Penn Steel Area, the Trenton Gravel overlies the Precambrian age Wissahickon Formation, which is typically characterized as a medium- to coarse-grained, banded, micaceous schist. The upper section of the Wissahickon Schist commonly weathers to a dense, low permeability "saprolite" layer, which generally serves as an aquitard between the water table aquifer in the unconsolidated sediments and the underlying bedrock. Consistent with thickness of the overlying units, the depth to bedrock and/or saprolite varies from the northwest corner of the site to the southeast corner of the site. Bedrock was encountered at a depth of approximately 20 feet in the northwest corner of the site and at approximately 60 feet below ground surface (bgs) at the southeast corner of the site.

2.5 Hydrogeology

Based on recent groundwater gauging data (Table 1) and historical groundwater flow maps developed for the site, groundwater flows radially toward, and discharges to, the Chester Creek and Delaware River (Figures 4 and 5). Depth to groundwater ranges from approximately 5 to 9 feet bgs depending on the time of year and the tidal cycle on the adjacent Delaware River. The hydraulic gradient across the site is approximately 0.003. Slug tests completed by Roux Associates, Inc. (Roux) indicate that the permeability of the fill material is approximately 2.8 feet per day (ft/day) and the permeability of the

deeper units is approximately 0.03 ft/day (ABB, 1996). Based on the presence of the saprolite overlying the bedrock, which commonly weathers to an aquitard-like material, and the approximately two to three orders of magnitude difference in the horizontal permeability between the fill material and the deeper units, ABB (1996) concluded that the predominant groundwater flow pathway would be laterally to the Delaware River and/or Chester Creek, rather than downward toward the bedrock.

Roux reported to Kimberly-Clark that the results of a 1998 tidal study indicated that the tidal influence of the Delaware River on groundwater levels in point of compliance (POC) monitoring wells near the shoreline resulted in less than one foot change in water level. No effect was noted in the shallow monitoring wells located away from the river. Another factor to consider that may potentially affect the groundwater dynamics across the site is that infiltration and recharge have been limited by the building and asphalt cover for approximately 100 years. This may retard the groundwater flow rate and transport and distribution of the residual separate-phase product. Notwithstanding the potential tidal influence and limited recharge, the overall site hydrogeologic model is characterized by a water-table zone that flows radially across the site and discharges to the Chester Creek and/or Delaware River.

Based on telephone conversations with the Chester Water Authority, the site and surrounding area are serviced by public water. The Chester Water Authority obtains 100 percent of its water from surface water supplies in the Susquehanna River Basin, located over 20 miles outside of the city. The main supply is withdrawn from the impoundment reservoir on Octorara Creek, along the Chester and Lancaster Counties border, located near Oxford, Pennsylvania. This supply is supplemented from a pumping station maintained on the Susquehanna River. Moreover, groundwater near the site is not used for municipal, domestic, or agricultural use, nor is the site known to fall within a Zone 2 Wellhead Protection Area. As such, groundwater at the site appears to meet the criteria to qualify as a non-use aquifer as described in 25 Pa. Code 250.303.

3.0 SUMMARY OF INVESTIGATIONS

Since 1985, the Penn Steel Area has been extensively investigated in order to characterize the nature and vertical and horizontal extent of historical impacts at the site. Between 1985 and 2001, Kimberly-Clark has completed the following:

- The excavation and field screening of 28 test pits;
- The installation of 26 soil borings;
- The installation of 17 temporary monitoring points or piezometers to evaluate the residual separate-phase product distribution;
- The installation (and various replacement) of 15 monitoring wells;
- Laboratory analysis of soil and groundwater samples in direct contact with the residual separate-phase product in order to quantify the “worst case” concentrations in the subsurface;
- The collection and analyses of over 100 groundwater samples over the course of 14 separate groundwater sampling events;
- The completion of a tidal study to evaluate the potential influence of tidal variations in the Delaware River on site water levels and the potential for a residual product “smear zone” in soil; and
- The completion of slug tests to characterize the site-specific hydraulic conductivity.

The extensive volume of data developed through these numerous activities has provided the temporal data (over a 16-year period), the spatial data (across the entire site), and seasonal data (over eight successive quarters) needed to demonstrate attainment of Act 2 standards and support Kimberly-Clark’s request for site closure.

The historical soil boring, test pit, and monitoring well locations are shown on Figure 6 and 7. Monitoring well logs and construction details are provided in Appendix D. A summary of the well construction details is provided in Table 2. The results of the site investigations with regards

to the soil, groundwater, and residual separate-phase product are discussed in Section 4.3 through 4.5. The site investigation activities completed by each of the respective consulting firms retained by Kimberly-Clark are described below.

3.1 Roux Associates, Inc. - 1985

In 1985, in response to the detection of residual separate-phase product in the subsurface during construction of the coal storage and handling facility, Kimberly-Clark retained Roux to conduct a site investigation in the Penn Steel Area. The results of the Roux site investigation were summarized in the December 1985 Roux report, *Site Investigation*. Roux completed 17 test pits, installed 15 soil borings, 5 piezometers, and seven groundwater monitoring wells. In addition, Roux conducted a tidal survey, completed aquifer permeability tests, and collected soil and groundwater samples for laboratory analyses of semi-volatile organic compounds (SVOCs), including base neutral extractable compounds (BNs) and acid extractable compounds (AEs), and volatile organic compounds (VOCs).

The results of the initial Roux site investigation indicated that a measurable thickness of residual petroleum was limited to the vicinity of MW-5 and MW-7, near the former Power House location. Globules of residual product were observed in test pits and soil borings installed downgradient from MW-5. Concentrations of SVOCs were present in the soil samples submitted for laboratory analyses. Low concentrations of SVOCs and VOCs were detected in groundwater. The initial data indicated that residual petroleum product was viscous and highly weathered and/or comprised of low solubility hydrocarbons.

3.2 Triegel & Associates, Inc. - 1987 to 1994

Between 1987 and 1994, Kimberly-Clark retained Triegel & Associates, Inc. (Triegel) to complete additional investigation in the Penn Steel Area. The additional investigations were completed to generally fulfill the prevailing PADEP investigation requirements, *Environmental Investigation Guidelines* (EIG). During the first phase of investigation in 1987, Triegel installed 11 borings (TB-25 through TB-35) and constructed three replacement and two new monitoring

wells. In addition, groundwater and oil/groundwater mixture samples were collected from select wells for laboratory analyses of petroleum constituents (VOCs and SVOCs), pesticides, and polychlorinated biphenyls (PCBs).

In 1991, Triegel abandoned and replaced nine monitoring wells that were damaged between 1987 and 1991 and installed one new monitoring well (MW-8). Groundwater samples were collected from the monitoring well network and submitted for laboratory analyses of petroleum constituents (VOCs and SVOCs). In 1994, Triegel collected groundwater samples for laboratory analyses of dissolved inorganic concentrations, consistent with the Act 2 guidance.

The results of the Triegel investigation confirmed that the presence of residual separate-phase product near MW-5 and MW-7 was limited to the fill material or the upper clayey silt units of the remnant "meadow mat". Soil and groundwater samples collected during these phases of investigation indicated that, generally, the weathered product did not contain VOCs at concentrations that readily emitted organic vapors and/or resulted in high concentrations of dissolved-phase VOCs in groundwater. Based on downgradient monitoring well data, the Triegel studies indicated that site-related constituents (primarily SVOCs) detected in upgradient groundwater in direct contact with the residual petroleum product did not appear to be migrating or discharging to Chester Creek or the Delaware River.

3.3 Asea, Brown, and Boveri - 1995

In 1995, PADEP issued a draft version of the Land Recycling and Environmental Remediation Standards Act (Act 2). In response to Act 2, Kimberly-Clark retained Asea, Brown, and Boveri (ABB) to develop a proposed action plan to bring the Penn Steel Area to closure with consideration of the Act 2 guidance. This report, *Final Proposed Action Plan*, was submitted to PADEP in May 1996. The action plan recommended collecting additional groundwater samples, instituting a Site Management Plan, and evaluating separate-phase product recovery feasibility and methods. PADEP has not provided comments to the *Final Proposed Action Plan* in the over five-year interim period since submission by Kimberly-Clark.

3.4 Roux Associates, Inc. - 1997 to 1999

Between 1997 and 1999, Kimberly-Clark retained Roux to complete further investigation in the Penn Steel Area. The activities completed by Roux included the following:

- The installation of eight temporary Geoprobe monitoring points (TP-1 through TP-8) to evaluate the distribution of separate-phase product downgradient of MW-6R, MW-7R, and MW-8;
- The installation of three monitoring wells (MW-9, MW-10, and MW-11) downgradient of the existing wells with measurable free product and the installation of two monitoring wells to provide more comprehensive coverage along the downgradient (point of compliance) boundary of the Penn Steel Area (MW-12 and MW-13);
- The installation of eleven test pits (EX-1 through EX-11) adjacent to the Delaware River to evaluate the potential for historical free product migration downgradient of the point of compliance wells;
- The installation of four temporary monitoring points (MP-1 through MP-4) in the backfill of the test pits where residual separate-phase globules may have been present;
- Gauging of the site monitoring wells and temporary monitoring points to evaluate the residual separate-phase product distribution and thickness; and
- The collection of two rounds of groundwater samples from site monitoring wells (in 1997 and 1998) with laboratory analyses of benzene, toluene, ethylbenzene, and xylenes (BTEX) in the 1997 sampling round and Act 2 Petroleum Shortlist parameters in the 1998 sampling round.

The Roux investigations were focused toward evaluating the distribution of the residual separate-phase product, assessing the technical feasibility of recovering the highly weathered, viscous residual product that is present in globules and discontinuous sheens in the central portion of the site, and establishing a point of compliance monitoring well network to demonstrate attainment of the Act 2 standards. In addition, the groundwater samples collected during the 1997 sampling

event were submitted for laboratory analysis of total dissolved solids (TDS) to assess the potential that the TDS were greater than the 2,500 milligrams per liter (mg/l) threshold required for application of alternate Act 2 groundwater standards.

Results of the later Roux investigation indicated that residual separate-phase product was present in isolated pockets near MW-6R, MW-8 and MW-10. Residual product was present in MW-6R at a maximum thickness of 0.17 feet and measured in MW-8 and MW-10 at a thickness of less than 0.1 feet. Residual product was not present in a measurable thickness in the point of compliance monitoring wells or in the residual separate-phase product investigation points installed along the downgradient boundary of the site. Moving from west to east along the downgradient edge of the site (see Figure 7), Roux did not observe and/or subsequently measure residual product in MW-2SRR, MW-2DR, EX-3, MP-1, MW-11, EX-4, EX-9, EX-10, MP-3, MP-4, MP-2, MW-12, EX-8, EX-5, MW-4, or MW-13.

3.5 Atlantic Environmental Consulting Services, LLC - 1999 through 2001

In 1999, Kimberly-Clark retained Atlantic to complete additional rounds of groundwater sampling to fulfill the minimum requirements of Act 2. Act 2 specifies that data collected before 1995 will generally not be accepted by PADEP to support closure requests, and, generally, that a minimum of eight successive rounds of groundwater samples be collected from point of compliance wells to document compliance with Act 2 standards. As a conservative approach, Kimberly-Clark retained Atlantic to collect eight rounds of groundwater samples from point of compliance wells, and MW-8 and MW-10, between September 1999 and June 2001. Groundwater samples were collected from the oil/water interface in monitoring wells MW-8 and MW-10 in order to develop data on the dissolution of the residual petroleum constituents from the weathered, residual product into groundwater in direct contact with the residual oil and confirm that the dissolved-phase constituents detected in monitoring wells MW-8 and MW-10 attenuate prior to migrating to the POC wells.

In addition, Atlantic conducted a product recovery program in select wells (MW-1SR, MW-6, MW-8, and MW-10) for eight weeks during April and May 2000. The product recovery program included gauging and bailing of product and changing sorbent socks, as needed, once a week in MW-1SR, MW-8, and MW-10 and installation of a passive recovery bailer in MW-6. The passive recovery bailer remained in place through June 2001. Atlantic gauged the site wells to confirm the groundwater flow direction toward Chester Creek and the Delaware River. Atlantic also conducted further research on the historical use and development of the site in order to integrate the historical site use and potential areas of concern with the current conditions and site closure strategy presented in this document.

the downgradient boundary of the site. Laboratory results for the analyses of groundwater samples collected from the POC monitoring wells indicate that the concentrations of dissolved-phase petroleum constituents are either not detected or are below the used aquifer, non-residential MSCs and, therefore, the dissolved-phase constituents associated with the residual petroleum at the site attenuate prior to migrating past the POC boundary.

Movement of separate-phase product and dissolved-phase petroleum constituents would likely be retarded due to the highly weathered and viscous nature of the residual product and by the effective elimination or reduction in infiltration by the asphalt cap covering the portion of the site containing the residual petroleum.

4.2 Age of Release

The Penn Steel Area has been used for industrial purposes for over 100 years. Kimberly-Clark (formerly Scott Paper) acquired the property in 1971. Subsequent to that time, Kimberly-Clark has used the approximately 14-acre area for tractor trailer parking and coal storage and handling. Kimberly-Clark reports that they have no knowledge of spills or releases of petroleum products or hazardous materials in the Penn Steel Area during their tenure of operation. As such, it is presumed that the residual petroleum materials present in the Penn Steel Area were released prior to 1971.

The residual petroleum is present near the footprint of the former Power House for the Penn Steel foundry, which operated at the site for approximately 75 years. The Power House contained a boiler room and an engine room that may have potentially been a source of heating oils (see 1953 Sanborn in Appendix A). Thus, the residual petroleum materials have likely been weathering and attenuating for a minimum of 30 years.

4.3 Separate-Phase Product Results

4.3.1 Separate-Phase Product Distribution

As described by ABB (1996), the Roux report indicated that a layer of weathered, low-solubility residual separate-phase product was present in the north-central portion of the site (near the former Power House and the current location of monitoring well MW-5). Recent investigations have confirmed the presence of residual product along the upgradient property boundary in monitoring well MW-6R. A measurable thickness of residual product (generally less than 0.1 inch) has been detected in monitoring wells MW-5 and MW-6R. In addition, globules of residual product have been measured in monitoring wells MW-8, MW-10, and MW-1SR (Table 3).

Isolated pockets of product globules or a discontinuous sheen of residual product were noted by Roux and Triegel in test pits, soil borings, and groundwater monitoring points at various locations in the downgradient direction from MW-5. Consistent with the historical site operations and the groundwater flow direction, residual product has been observed within the limits of a pie-shaped wedge with the apex near MW-5 that radiates to an arc that extends approximately from monitoring well MW-8 to monitoring well MW-1SR. However, temporary monitoring points and test pits installed by Roux indicate that the residual product is present in pockets rather than a continuous layer across the site.

Most importantly, residual product was not present in a measurable thickness in the point of compliance monitoring wells or in the residual separate-phase product investigation points installed along the downgradient boundary of the site. Moving from west to east along the downgradient edge of the site (see Figure 7), Roux did not observe and/or subsequently measure residual product in MW-2SRR, MW-2DR, EX-3, MP-1, MW-11, EX-4, EX-9, EX-10, MP-3, MP-4, MP-2, MW-12, EX-8, EX-5, MW-4, or MW-13. Furthermore, product seeps have not been observed along the Delaware River during routine inspection of the streambank throughout the recent, quarterly groundwater sampling events completed between September 1999 and May 2001. These observations indicate that the highly-weathered, viscous product is immobile and stable and is not discharging to the Delaware River.

4.3.2 Separate-Phase Product Age, Composition, and Persistence

As shown in Table 4, laboratory analyses of oil collected from monitoring well MW-5 indicate that the oil is comprised of long-chain, low solubility PAHs (naphthalene, phenanthrene, fluoranthene, and pyrene). These data indicate that the residual product is an old, highly weathered product and/or was originally a heating oil or longer-chain oil. As discussed in Section 4.5, this is consistent with the groundwater results that indicate dissolved-phase VOCs (e.g., BTEX) are generally not present in groundwater or are present at concentrations below the Act 2 standards, and that the PAH concentrations in groundwater in direct contact with the residual product are low. Field observations further confirm the weathered nature of the product. Over the eight quarters of compliance sampling conducted by Atlantic, the viscous product did not readily emit vapors detectable with a photoionization detector (PID).

The persistence of the product in the subsurface over 30 years past the presumed release date is potentially a function of the following:

- The product is viscous and readily adsorbs to the soil;
- Tidal and seasonal fluctuations have created a “smear zone”, which may entrain product globules beneath the water table; and
- Portions of the upper fill zone that contained residual product may have been reworked and replaced during demolition and re-grading activities.

There are no records, maps, documents, or other basis to suggest that an ongoing source of product remains on site. As shown on Figures 6 and 7, the site has been extensively investigated (including 28 test pits) and no underground storage tanks or product conveyance piping were observed during the site investigation or previously encountered during the construction of the Penn Steel Area parking lot. The technical impracticability of recovering the highly-weathered, viscous residual separate-phase product, which is present in globules, a sheen, or thickness of approximately 0.10 feet or less is presented in Chapter 6.0.

4.4 Soil Sample Results

Roux collected three soil samples for laboratory analyses of SVOC and VOC concentrations. Soil samples TB-1 and TB-7 were collected from known residual product areas (i.e., soil in direct contact with and containing residual product) in order to focus on potential “worst case” soil concentrations. As shown in Table 5, the soil samples contained the PAH constituents detected in the residual product collected from monitoring well MW-5. The concentrations of PAHs in direct contact with product-containing soil samples were two orders of magnitude less than the direct contact and the soil-to-groundwater numeric values for a non-residential property.

In addition to meeting the Act 2 MSCs in the two specific “worst case” soil samples, a more general, site-wide *ad hoc* equivalency demonstration (25 Pa. 250.308) has been completed for soil-to-groundwater constituent partitioning in the Penn Steel Area. The Act 2 guidance specifies that the equivalency demonstration shall establish the regulated substances in soil will not migrate to groundwater within 30 years at concentrations exceeding the groundwater MSC. Given that the release of the residual product occurred over 30 years ago (see Section 4.2), real-time empirical data may be considered in lieu of, and is more applicable than, a fate and transport analyses. As discussed in Section 4.5 and consistent with the Act 2 guidance, eight successive rounds of groundwater samples were collected from site monitoring wells. The groundwater data demonstrates that there are no statistical exceedances of groundwater MSCs (e.g., 75%/10x rule) and that there is a decreasing trend in the PAH concentrations for monitoring wells MW-8 and MW-10, which are constructed in soil containing residual product. In addition, the asphalt cap limits infiltration of precipitation through the soil zone and the potential for flushing of residual petroleum constituents into the groundwater.

In summary, concentrations of residual petroleum constituents in soil samples collected in direct contact with residual product meet Act 2 standards. Furthermore, groundwater data indicates that residual product in soil and/or concentrations of residual petroleum constituents in site soil are not contributing to exceedances of groundwater MSCs. Finally, direct contact (ingestion and inhalation) pathways have been eliminated by the paved parking lot capping the Penn Steel Area. The parking lot is an integral feature of the current and projected use of the Penn Steel Area as a

storage area for finished goods. Kimberly-Clark will be a steward for the property for the foreseeable future and will continue to maintain the asphalt parking lot and control and monitor intrusive activities in the Penn Steel Area, if excavation is required during future routine maintenance or construction activities. As such, no further soil investigation or remediation appears to be warranted.

4.5 Groundwater Sample Results

During the last 16-year period, over 100 groundwater samples have been collected in the Penn Steel Area from the 15-well monitoring network that provides thorough coverage of the site. The groundwater impacts are associated with historical release of petroleum product that occurred over 30 years ago. As discussed below, a limited suite of low solubility, long-chain hydrocarbon compounds have been detected in residual product and/or dissolved in groundwater.

The volume of empirical groundwater data developed for the site allows for demonstration of constituent concentration attenuation over time. Due to the age of the release, weathering of the low solubility residual product, the well-documented natural attenuation of petroleum constituents over time, and the limited infiltration/flushing resulting from the asphalt parking lot capping the Penn Steel Area, constituent concentrations in groundwater have decreased during the last 16 years to levels below the Act 2 used aquifer groundwater standards at the downgradient point of compliance (Figure 8).

Although the Act 2 standards specify that a limited "shortlist" of parameters be evaluated for releases associated with heating oils, at various times during the site investigation in the Penn Steel Area, full priority pollutant scans of VOCs and SVOCs have been completed. In addition, although not required by Act 2 guidance, dissolved organics, pesticides and PCBs analyses of groundwater samples have also been completed. Thus, Kimberly-Clark has exceeded the investigation requirements for demonstrating attainment of the specified standards.

Laboratory data packages for the analyses of groundwater samples collected between 1987 and 1998 are provided in Appendix E. Laboratory data packages for the eight quarter point of compliance monitoring well program completed between September 1999 and May 2001 are provided in Appendix F.

4.5.1 Dissolved Inorganic Compounds in Groundwater

As shown in Table 6, with the exception of zinc, dissolved inorganic compounds were not detected in groundwater. The concentrations of zinc are one to two orders of magnitude less than the used aquifer, non-residential MSC.

The maximum concentration of total dissolved solids in groundwater at the site is 540 milligrams per liter (mg/l). The TDS concentrations in groundwater are well below the 2,500 mg/l threshold for application of alternate used aquifer standards.

4.5.2 Pesticides and PCBs in Groundwater

As shown in Table 7, only two pesticides (DDE and DDT) were detected in one monitoring well, MW-1D. The concentrations of the pesticides are less than the Act 2 groundwater standards. PCBs were not detected in site groundwater.

4.5.3 VOCs in Groundwater

As shown in Tables 8 through 12, VOC analyses of groundwater have been completed at various times in select monitoring wells between 1985 and 2001. The data demonstrate that VOCs are generally not present in site groundwater. During the 16-year monitoring history, only three compounds (methylene chloride, benzene, and cumene) have been reported at concentrations in excess of the used aquifer, non-residential standards. In 1985, methylene chloride was reported at concentrations above the current standards in three wells (Table 8). Groundwater sample results from 1987 (Table 9), and again in 1991 (Table 10), demonstrate that the methylene chloride

concentrations in site groundwater were less than the standards and/or not detected. The initial reporting of methylene chloride in site groundwater may have been a lab artifact.

Site data demonstrates that concentrations of both benzene and cumene have attenuated over time. As shown below, benzene concentrations initially detected in monitoring wells MW-3 and MW-5 attenuated to none detectable concentrations between 1985 and 1998.

Attenuation of Benzene in Groundwater Over Time					
Monitoring Well/Date	1985	1987	1991	1997	1998
MW-3	26	NS	ND	ND	ND
MW-5	NS	79	23	ND	ND
Concentrations in micrograms per liter (ug/l).					

Cumene was detected in monitoring well MW-12 during the 1998 sampling event at a concentration of 8 micrograms per liter (ug/l). During eight successive quarters of groundwater sample collection between September 1999 and May 2001, cumene was not detected in monitoring well MW-12 (Table 23).

The groundwater sample data is consistent with the soil data, the PID field screening data, and the data for the analyses of the residual separate-phase product, all four of which demonstrate that VOCs are generally not associated with residual petroleum, nor constituents of concern, in the Penn Steel Area.

4.5.4 SVOC/PAHs in Groundwater

As presented in Section 4.2, the weathered residual product in the Penn Steel Area contains concentrations of PAHs. In turn, low concentrations of specific PAH compounds (e.g., naphthalene, fluorene, phenanthrene, and pyrene) have been detected in dissolved-phase groundwater (Tables 13 through 16). The concentrations of PAHs in groundwater have

historically been near or below the used aquifer, non-residential MSCs. The highest historical concentrations of PAHs were reported in an oil/water mixture grab sample collected from the static water/product interface of monitoring well MW-5R in 1987. As summarized below and shown on Tables 14 through 16, the dissolved-phase concentrations attenuated to below the limit of detection over the ensuing 10 years.

Attenuation of PAHs in Groundwater Over Time in MW-5(R)				
Parameter	1985 Oil	1987 Oil/Water Mix	1991 Oil/Water Mix	1998 Water
Naphthalene	3,200	ND	91	ND
Phenanthrene	800	3,000	240	ND
Fluoranthene	600	ND	ND	ND
Pyrene	200	ND	120	ND
Concentrations in ug/l.				

Similar attenuative decreases in PAH concentrations are demonstrated in monitoring wells MW-8 and MW-10. Discontinuous, residual product globules are present in both of these wells. As shown in Tables 16 through 18, the PAH concentrations in both wells decreased to below used aquifer, non-residential MSCs between December 1998 and May 2001. As shown on the groundwater flow map (Figure 4), monitoring wells MW-8 and MW-10 are located downgradient from the area where a measurable thickness of residual product has been documented (i.e., monitoring wells MW-5, MW-6, and MW-7 in the historical Power House area) and upgradient from the point of compliance monitoring wells.

In order to augment the historical groundwater data developed between 1985 and 1998, Kimberly-Clark retained Atlantic to complete eight successive quarters of groundwater monitoring in the point of compliance wells located on the downgradient edge of the Penn Steel Area, adjacent to Chester Creek and Delaware River. As shown in Tables 19 through 24 and on Figure 8, PAH concentrations in

groundwater at the point of compliance property boundary are below the limit of detection or statistically below the used aquifer, MSCs.

Although compliance with the used aquifer standards has been demonstrated, it is worth noting that the City of Chester Water Authority draws its water from surface water sources located in the Susquehanna River Basin, approximately 20 miles away, and it has no future plans for using groundwater drawn from the City of Chester area. Moreover, groundwater near the site is not used for municipal, domestic, or agricultural purposes, nor is the site known to fall within a Zone 2 Wellhead Protection Area. As such, groundwater at the site appears to meet the criteria to qualify as a non-use aquifer as described in 25 Pa. Code 250.303.

Finally, the groundwater monitoring data demonstrate that the residual separate-phase product is not contributing to exceedances of used aquifer MSCs at the point of compliance, that historical exceedances have attenuated over time to below the MSCs, and that the residual product distribution and constituent partitioning is stable and/or continuing to decrease with time. Thus, the groundwater data support the conclusions drawn in Chapter 6.0. Specifically, that active remediation of the residual product is not warranted or necessary to protect on-site groundwater quality.

5.0 ECOLOGICAL SCREENING

A preliminary ecological screening considering Section 250.311 of Act 2 for the Penn Steel Area indicates the following:

- The Penn Steel Area is covered by buildings, structures, asphalt-covered parking lots, roadways, and gravel/trap rock. These features appear to be sufficiently extensive as to eliminate specific exposure pathways to ecological receptors and, therefore, allow for truncation of the ecological screening process through “obvious pathway elimination”.
- The western portion of the site has essentially been completely covered by industrial buildings of Penn Steel and or the Kimberly-Clark paved parking area for over 100 years. Soil on the eastern portion of the site has been covered by the coal storage and handling operations for over 15 years. The site is located in an area zoned for heavy industry and will continue to be used for industrial purposes for the foreseeable future.
- National Wetlands Inventory maps (NWI, 1967) on file at the Delaware County Natural Resource Conservation District indicate that there are no mapped wetlands at the site.

Thus, there do not appear to be environmentally sensitive areas within the operational portions of the Penn Steel Area. In addition, Kimberly-Clark retained H&A Inc. of Newtown Square, Pennsylvania to complete an environmental assessment in support of the permit application for the bulkhead repair work on the opposite side of Chester Creek. In it's report, H&A states the following:

- The Natural Areas Inventory for Delaware County, Pennsylvania (1992) does not list sites of statewide significance for the protection of biological diversity or any sites of local significance based on size, diversity of wildlife and plant life, water quality protection, and

recreational potential within or adjacent to the Site. The nearest listed site is Little Tinicum Island, which is located over two miles upstream from the Site;

- The Pennsylvania Natural Diversity Index (PNDI) search for portions of the Delaware River near the Site indicate no potential impacts to habitats for threatened or endangered plant or animal species associated with the Site; and
- The recreational value of the Delaware River and adjacent land in the vicinity of Chester is minimal.

Collectively, the above-referenced data indicate that ecological features of concern are not present in the Penn Steel Area and that no further ecological screening is warranted.

6.0 REMEDIATION AND TECHNICAL IMPRACTABILITY

The volume of site data indicates that the residual petroleum constituents in the Penn Steel Area do not pose a risk to human or ecological receptors. Remediation of the residual separate-phase product currently present at the site in measurable thickness of 0.1 inch or less, present as a discontinuous sheen, or as globules is not warranted, based on the following:

- The weathered residual product, or groundwater in direct contact with the residual product, do not contain VOCs. The residual product does not readily emit vapors, and there are no habitable subsurface structures in the Penn Steel Area. Thus, there is no inhalation pathway.
- The soil containing residual product is capped by the asphalt parking lot, thereby eliminating or minimizing the potential human exposure pathway (ingestion) or ecological migration pathways. The parking lot is an integral feature of the current and projected use of the Penn Steel Area as a storage area for finished goods. Kimberly-Clark will be a steward for the property for the foreseeable future and will continue to maintain the asphalt parking lot and control and monitor intrusive activities in the Penn Steel Area.
- As discussed in Chapter 9.0, Kimberly-Clark has developed a Site Management Plan (SMP) to be maintained on file in the appropriate departments. The SMP was developed in order to control and/or monitor subsurface activities in the Penn Steel Area and to ensure that soil/residual product will be properly handled to minimize potential exposure to Kimberly-Clark workers or contractors.
- Access to the Penn Steel Area is monitored by a 24-hour guard service, and an 8-foot high, chain link fence surrounds the Penn Steel Area. As such, only Kimberly-Clark employees and/or registered contractors may gain access to the site. In addition, the site

has been used for industrial purposes for over 100 years, is located in an area zoned for heavy industry, and will continue to be used for industrial purposes for the foreseeable futures.

- Current and historical data also indicate that the separate-phase product is weathered, viscous and immobile and has not migrated past the downgradient POC wells toward the Delaware River. The asphalt cap limits infiltration, which combined with the viscous nature of the weathered product, results in stability of the product distribution. Eight successive quarters of monitoring data from the POC wells demonstrate that the used aquifer MSCs are not statistically exceeded at the site.
- As discussed in Section 4.5, the residual product is not contributing to dissolved-phase constituent concentrations in groundwater in excess of the Act 2 MSCs at the downgradient POC wells. More recent data from monitoring wells MW-8 and MW-10 demonstrates that groundwater in direct contact with the residual product globules does not contain constituent concentrations that exceed used aquifer, non-residential MSCs.
- Finally, as shown in Table 3, Atlantic evaluated passive recovery efforts during an 8-week product recovery program. This study indicated that the viscous product is present in globules or discontinuous sheens that are not practicably recoverable.

Collectively, these data indicate that remediation of the discontinuous product is not feasible or warranted.

7.0 STANDARD ATTAINMENT AND PATHWAY ELIMINATION

7.1 Soil Exposure Pathway Elimination

In the Penn Steel Area, the soil exposure pathway has been eliminated by the asphalt cap and gravel/trap rock covering the area. In addition, groundwater data and site conditions indicate that soil investigation and/or remediation is not warranted.

As previously outlined, only Kimberly-Clark employees and supervised contractors have access to the area, which is capped by asphalt pavement. Thus, exposure to the subsurface soil would be limited to subsurface maintenance activities. Implementation of a Site Management Plan specifying procedures and monitoring for intrusive activities would limit potential exposure of site workers or contractors to residual petroleum in site soil. Furthermore, the results for the two "worst case" soil samples collected by Roux indicate that the residual petroleum concentrations in the two soil samples were less than PADEP criteria for a commercial, non-use aquifer property. Finally, the asphalt cap limits infiltration of precipitation through the soil zone and the potential for flushing of residual petroleum constituents into the groundwater. The groundwater data indicates that residual petroleum in soil is not adversely affecting groundwater quality in the downgradient point of compliance wells. Kimberly-Clark will continue to be a steward of the property and maintain its use for industrial purposes for the foreseeable future.

7.2 Attainment of Groundwater MSCs

As discussed in Section 4.5, the results for the analyses of groundwater samples collected from the point of compliance monitoring wells indicate that residual dissolved-phase petroleum constituents are not present in groundwater and/or are present at concentrations less than Act 2 used aquifer, residential MSCs. Thus, attainment of the groundwater MSCs in accordance with Act 2 (25 Pa. Code 250.704) has been demonstrated in the Penn Steel Area.

8.0 FATE AND TRANSPORT ANALYSIS

The residual petroleum in the Penn Steel Area is related to operations that were terminated over 30 years ago. Given that the Act 2 regulations call for soil partitioning and groundwater transport analyses that are based on a 30-year period (25 Pa. 250.308 and 250.705), the real-time empirical data developed for the site is more applicable to, and better represents, site conditions than assigned model input parameters. The site data demonstrates that residual petroleum constituents are no longer partitioning from residual product or soil at concentrations that result in exceedances of used aquifer, non-residential standards. As such, attainment of the Act 2 groundwater standards has been demonstrated and, therefore, fate and transport modeling is not warranted for the Penn Steel Area.

9.0 POST-REMEDATION CARE

In the Penn Steel Area, direct contact exposure pathways for soil and groundwater have been eliminated by asphalt caps, boundary fences, and gates monitored by security guards (engineering controls). Potential direct contact exposure of site workers or contractors to soil or groundwater containing residual petroleum constituents will be effectively managed through a Site Management Plan (SMP)(Atlantic, 2001, provided under separate cover). The SMP will be maintained on file in the appropriate Kimberly-Clark departments and outline the appropriate procedures and monitoring guidelines for intrusive activities in the Penn Steel Area. In addition, Kimberly-Clark will continue to be a steward for the property, and overall site inspections and asphalt cap inspection and maintenance programs will be addressed in the Site Management Plan.

Upon implementation of Site Management Plan, hypothetical environmental exposure routes to the residual petroleum constituents would generally be limited to the potential for diffuse discharge of dissolved-phase constituents or migration of separate-phase product to the Delaware River or Chester Creek. As documented herein, after over 30 years, the historical site data demonstrate that dissolved-phase petroleum constituents attenuate prior to migrating past the point of compliance wells and that the separate-phase product is stable and immobile due to its weathered condition and the limited recharge from the asphalt cap.

Upon approval of the Final Report and SMP by PADEP, Kimberly-Clark will properly abandoned the upgradient monitoring wells, MW-1DR and MW-2DRR, and MP-2 and MP-3. The point of compliance wells will be maintained.

10.0 REFERENCES

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Table 1. Groundwater Elevations in Monitoring Wells, May 18, 2001. Penn Steel Area.
Kimberly-Clark, Chester, Pennsylvania.

Monitoring Well/Point	Measuring Point Elevation	Depth to Product	Depth to Water	Corrected Groundwater Elevation
MW-1SR	8.75	--	5.55	3.20
MW-1DR	8.75	--	5.84	2.91
MW-2SRR	10.52	--	8.02	2.50
MW-2DR	10.40	--	7.94	2.46
MW-3RR	14.24	--	9.94	4.30
MW-4	9.68	--	7.48	2.20
MW-5RR	12.67	NM	--	--
MW-6R	12.39	8.21	8.25	4.15
MW-7R	12.68	NM	--	--
MW-8	10.03	Globules	5.83	4.20
MW-9	11.66	--	7.73	3.93
MW-10	11.55	Globules	5.90	5.65
MW-11	10.09	--	7.57	2.52
MW-12	10.40	--	7.71	2.69
MW-13	10.15	--	6.90	3.25
MP-2	9.82	--	7.18	2.64
MP-3	9.51	--	6.77	2.74

Elevations in feet above mean sea level.

Depth readings in feet below measuring point.

NM=Well silted in or damaged.

Globules=Discontinuous globules of weathered product on interface probe.

-- = No product measured.

Table 2. Monitoring Well Construction Details. Penn Steel Area. Kimberly-Clark, Chester, Pennsylvania.

Well Number	Date Installed	Depth of Boring	Screened Interval	Elevation of Monitoring Point
MW-1S	8/26/85	15.00	4.70-14.70	Abandoned
MW-1SR	9/26/91	13.00	2.75-12.75	8.75
MW-1D	8/22/85	63.50	53.44-63.44	Abandoned
MW-1DR	9/25/91	65.00	45.00-55.00	8.75
MW-2S	8/29/85	15.00	4.44-14.44	Abandoned
MW-2SR	5/18/87	20.00	10.00-19.80	Abandoned
MW-2SRR	9/26/91	16.25	6.00-16.00	10.52
MW-2D	8/29/85	58.00	37.51-47.51	Abandoned
MW-2DR	9/23/91	45.00	30.00-40.00	10.40
MW-3	8/30/85	19.50	8.30-18.30	Abandoned
MW-3R	5/18/87	18.00	8.00-17.80	Abandoned
MW-3RR	9/26/91	20.00	7.00-17.00	14.24
MW-4	9/3/85	60.10	4.45-14.45	9.68
MW-5	9/6/85	18.00	7.55-17.55	Abandoned
MW-5R	5/14/87	16.50	6.50-16.30	Abandoned
MW-5RR	9/27/91	17.00	3.75-13.75	12.67
MW-6	5/20/87	18.50	8.50-18.30	Abandoned
MW-6R	9/27/91	18.00	7.25-17.25	12.39
MW-7	5/21/87	17.00	7.00-16.80	Abandoned
MW-7R	9/27/91	17.00	5.00-15.00	12.68
MW-8	9/26/91	13.00	2.50-12.50	10.03
MW-9	12/1/98	15.00	2.00-15.00	11.66
MW-10	12/1/98	15.00	2.00-14.00	11.55
MW-11	12/1/98	19.00	4.00-19.00	10.09
MW-12	12/2/98	19.00	4.00-19.00	10.40
MW-13	12/2/98	19.00	4.00-19.00	10.15

Depths in feet below ground surface.

Elevations surveyed by Vargo 12/30/98. Elevations in feet above mean sea level.

Table 3. Product Gauging Data During Interim Recovery Study, Spring 2000. Penn Steel Area.
Kimberly-Clark, Chester, Pennsylvania.

Monitoring Point/ Date of Gauging	3/16/00	3/24/00	3/28/00	4/7/00	4/13/00	5/5/00	5/12/00	5/19/00
MW-1SR								
Depth to Product	4.92	4.51	3.89	5.08	5.94	4.80	4.73	4.82
Depth to Water	4.92	4.51	3.90	5.08	5.95	4.80	4.73	4.82
Product Thickness	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Comments	No Product	Globules	Globules	No Product	Sheen	Globules	Globules	Globules
MW-6R								
Depth to Product	7.58	6.50	7.20	7.86	8.36	8.12	9.05	9.10
Depth to Water	7.70	6.53	7.22	7.87	8.40	8.15	9.10	9.12
Product Thickness	0.12	0.03	0.02	0.01	0.04	0.03	0.05	0.02
Comments								
MW-8								
Depth to Product	5.39	4.48	5.30	5.50	5.62	5.68	5.77	5.83
Depth to Water	5.40	4.48	5.31	5.51	5.62	5.68	5.77	5.84
Product Thickness	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01
Comments	Sheen	Globules	Sheen	Sheen	No Product	No Product	No Product	Sheen
MW-10								
Depth to Product	5.57	4.78	5.63	5.78	5.70	5.91	5.90	5.81
Depth to Water	5.71	4.78	5.64	5.78	5.70	5.91	5.90	5.81
Product Thickness	0.14	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Comments	Viscous	Globules	Sheen	Globules	Globules	Sheen	Globules	Globules

Readings in feet below measuring point.

Globules=Discontinuous globules of weathered product on interface probe.

Table 4. Concentrations of Organics in Oil and Oily Media, August 1985. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Parameter	MW-5 Oil	TP-2 Sludge	TP-6 Sludge	TP-2 Oil/Water	TP-3 Oil/Water
<i>Base-Neutral Extractables</i>					
Isophorone	ND	ND	ND	ND	ND
Naphthalene	3,200	ND	36	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	ND	ND	ND	ND	ND
Phenanthrene	800	ND	54	ND	ND
Di-n-butyl phthalate	ND	ND	ND	ND	ND
Fluoranthene	600	ND	ND	ND	ND
Pyrene	200	ND	ND	170	ND
Butyl benzyl phthalate	ND	ND	ND	ND	ND
bis (2-ethylhexyl) phthalate	ND	ND	ND	80	ND
<i>Volatile Organic Compounds</i>					
Methylene Chloride	ND	ND	ND	ND	ND
Fluorotrichloromethane	ND	ND	0.5	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND
Toluene	53	ND	ND	ND	ND
Ethylbenzene	200	ND	ND	ND	ND

Oil/Water mixture concentrations in micrograms per liter (ug/l).

Oil and sludge concentrations in milligrams per kilogram (mg/kg).

"Sludge" is believed to be saturated oily sediment.

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

Table 5. Concentrations of Organics in Soil, August 1985. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Parameter	TP-14	TB-1 (10-12')	TB-7 (8-10')
<i>Base-Neutral Extractables</i>			
Benzo(a)pyrene	ND	ND	ND
bis (2-ethylhexyl) phthalate	0.7	10	ND
Di-n-butyl phthalate	0.6	ND	ND
Fluoranthene	ND	ND	1.2
Fluorene	ND	ND	2.4
Naphthalene	ND	ND	ND
Phenanthrene	ND	2.0	3.0
Pyrene	ND	0.5	3.1
<i>Volatile Organic Compounds</i>			
Methylene Chloride	ND	ND	0.1
Fluorotrichloromethane	ND	1.4	0.2

Soil concentrations in milligrams per kilogram (mg/kg).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

Table 6. Dissolved Inorganic Compound Concentrations in Groundwater, October 1994. Penn Steel Area. Kimberly-Clark, Chester, PA.

Inorganic Compound	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3RR	MW-4	MW-5RR	MW-6R	MW-8
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium (VI)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	220	ND	37	20	ND	ND	77	ND
Total Dissolved Solids	530	410	320	340	400	540	480	NA	NA

Concentrations in micrograms per liter (ug/l).

TDS concentrations in milligrams per liter (mg/l).

TDS data collected in October 1994 (see Table 11, also).

1994 data provided by Triegel & Associates, Inc.

1997 data provided by Roux Associates, Inc.

Monitoring Well MW-7 not sampled.

ND = Not detected above the method detection limit.

NA=Not analyzed.

Table 7. Pesticide and Polychlorinated Biphenyl Concentrations in Groundwater, June 1987. Penn Steel Area. Chester, PA.

Parameter	MW-1S	MW-1D	MW-2SR	MW-4	MW-5R	MW-6R	MW-7
<i>Pesticides</i>							
Alpha BHC	ND	ND	ND	ND	ND	ND	ND
Beta BHC	ND	ND	ND	ND	ND	ND	ND
Gamma BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND
Delta BHC	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND
DDE	ND	0.1	ND	ND	ND	ND	ND
DDD	ND	ND	ND	ND	ND	ND	ND
DDT	ND	0.11	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND
Chlordane	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ND	ND	ND	ND	ND	ND	ND
<i>Polychlorinated Biphenyls</i>							
PCB-1016	ND	ND	ND	ND	ND	ND	ND
PCB-1221	ND	ND	ND	ND	ND	ND	ND
PCB-1232	ND	ND	ND	ND	ND	ND	ND
PCB-1242	ND	ND	ND	ND	ND	ND	ND
PCB-1248	ND	ND	ND	ND	ND	ND	ND
PCB-1254	ND	ND	ND	ND	ND	ND	ND
PCB-1260	ND	ND	ND	ND	ND	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

MW-5R and MW-7 samples were grab samples of oil/water mixture.

Monitoring wells MW-2D and MW-3 not sampled.

Table 8. Volatile Organic Compound Concentrations in Groundwater, September 1985. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Volatile Organic Compounds	MW-1S	MW-1D	MW-2S	MW-2D	MW-3	MW-4
Chloromethane	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	35	ND	280	11	72
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	5	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	26	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	6	ND
Fluorotrichloromethane	ND	ND	ND	ND	7	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

The 1985 data from the Roux Associates site investigation provided by Triegel & Associates, Inc.

Table 9. Volatile Organic Compound Concentrations in Groundwater, June 1987. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Volatile Organic Compounds	MW-1S	MW-1D	MW-2SR	MW-4	MW-5R	MW-6	MW-7
Chloromethane	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	4	ND	1	ND	2
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	1	ND	ND	79	8	4
Toluene	ND	ND	ND	ND	3	2	ND
Ethylbenzene	ND	ND	ND	ND	3	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

MW-5R and MW-7 samples were grab samples of oil/water mixture.

Table 10. Volatile Organic Compound Concentrations in Groundwater, October 1991. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Volatile Organic Compounds	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-6R	MW-7R	MW-8
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	6	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	23	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	35	ND	ND	ND
Fluorotrichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

MW-5RR sample was grab sample of oil/water mixture.

**Table 11. Volatile Organic Compound and TDS Concentrations in Groundwater, August 1997. Penn Steel Area.
Kimberly-Clark, Chester, PA.**

Parameter	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-7R
<i>Volatile Organic Compounds</i>								
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Xylene	ND	ND	ND	ND	ND	ND	ND	ND
<i>Total Dissolved Solids</i>	530	410	320	340	400	540	480	260

VOC concentrations in micrograms per liter (ug/l).
TDS concentrations in milligrams per liter (mg/l).
ND = Not detected above the method detection limit.
Data provided by Roux Associates, Inc.

Table 12. Volatile Organic Compound Concentrations in Groundwater, December 1998. Penn Steel Area. Chester, PA.

Volatile Organic Compounds	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
Benzene	<1	<1	<1	<1	<1	<1	<1	<1	1.2	<1	<1	<1	<1
Toluene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	<2	<2	4.3	<2	<2	<2	<2	<2	<2	<2	<2	3.9	<2
Cumene	<2	<2	2.9	<2	<2	<2	<2	<2	3.5	<2	<2	8.8	<2

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Roux Associates, Inc.

MW-10 sample was grab samples of static water beneath sheen of separate-phase product.

Table 13. Semi-Volatile Organic Compound Concentrations in Groundwater, September 1985. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1S	MW-1D	MW-2S	MW-2D	MW-3	MW-4
<i>Base-Neutral Extractables</i>						
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND
bis(2-chloroethyl)ether	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND
bis (2-chloroisopropyl) ether	ND	ND	ND	ND	ND	ND
hexachloroethane	ND	ND	ND	ND	ND	ND
nitrobenzene	ND	ND	ND	ND	ND	ND
isophorone	ND	ND	ND	ND	ND	ND
bis(2-chloroethoxy)methane	ND	ND	ND	ND	ND	ND
1,2,4-trichlorobenzene	ND	ND	ND	ND	ND	ND
naphthalene	ND	ND	ND	ND	ND	ND
hexachlorobutadiene	ND	ND	ND	ND	ND	ND
hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND
2-chloronaphthalene	ND	ND	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND	ND	ND
dimethyl phthalate	ND	ND	ND	ND	ND	ND
2,6-dinitrotoluene	ND	ND	ND	ND	ND	ND
acenaphthene	ND	ND	ND	ND	ND	ND
2,4-dinitrotoluene	ND	ND	ND	ND	ND	ND
fluorene	ND	ND	ND	ND	ND	ND
4-chlorophenylphenylether	ND	ND	ND	ND	ND	ND
diethyl phthalate	ND	ND	ND	ND	ND	ND
1,2-diphenylhydrazine	ND	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND
4-bromophenylphenylether	ND	ND	ND	ND	ND	ND
hexachlorobenzene	ND	ND	ND	ND	ND	ND
phenanthrene	ND	ND	ND	149	ND	ND
anthracene	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	ND	ND	ND	ND	ND	ND
fluoranthene	ND	ND	ND	ND	ND	ND
pyrene	ND	ND	ND	23	ND	ND
benzidine	ND	ND	ND	ND	ND	ND
butylbenzylphthalate	ND	ND	ND	ND	ND	ND
benzo(a)anthracene	ND	ND	ND	ND	ND	ND
chrysene	ND	ND	ND	ND	ND	ND
3,3'-dichlorobenzidine	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND
di-n-octylphthalate	ND	ND	ND	ND	ND	ND
benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND
benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND
benzo(a)pyrene	ND	ND	ND	ND	ND	ND
ideno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND
dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND
benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND

Table 13. Semi-Volatile Organic Compound Concentrations in Groundwater, September 1985. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1S	MW-1D	MW-2S	MW-2D	MW-3	MW-4
<i>Acid Extractables</i>						
2-chlorophenol	ND	ND	ND	ND	ND	ND
phenol	ND	ND	ND	ND	ND	ND
2-nitrophenol	ND	ND	ND	ND	ND	ND
2,4-dimethylphenol	ND	ND	ND	ND	ND	ND
2,4-dichlorophenol	ND	ND	ND	ND	ND	ND
4-chloro-3-methylphenol	ND	ND	ND	ND	ND	ND
2,4,6-trichlorophenol	ND	ND	ND	ND	ND	ND
2,4-dinitrophenol	ND	ND	ND	ND	ND	ND
4-nitrophenol	ND	ND	ND	ND	ND	ND
4,6-dinitro-2-methylphenol	ND	ND	ND	ND	ND	ND
pentochlorophenol	ND	ND	ND	ND	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

J-Estimated value.

The 1985 data from the Roux Associates site investigation provided by Triegel & Associates, Inc.

Table 14. Semi-Volatile Organic Compound Concentrations in Groundwater, June 1987. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1S	MW-1D	MW-2SR	MW-4	MW-5R	MW-6	MW-7
Base-Neutral Extractables							
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND
bis(2-chloroethyl)ether	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
bis (2-chloroisopropyl) ether	ND	ND	ND	ND	ND	ND	ND
hexachloroethane	ND	ND	ND	ND	ND	ND	ND
nitrobenzene	ND	ND	ND	ND	ND	ND	ND
isophorone	ND	ND	ND	ND	ND	ND	ND
bis(2-chloroethoxy)methane	ND	ND	ND	ND	ND	ND	ND
1,2,4-trichlorobenzene	ND	ND	ND	ND	ND	ND	ND
naphthalene	ND	ND	ND	ND	ND	ND	ND
hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND
hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	ND
2-chloronaphthalene	ND	ND	ND	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND	ND	ND	ND
dimethyl phthalate	ND	ND	ND	ND	ND	ND	ND
2,6-dinitrotoluene	ND	ND	ND	ND	ND	ND	ND
acenaphthene	ND	ND	ND	ND	ND	20	ND
2,4-dinitrotoluene	ND	ND	ND	ND	ND	ND	ND
fluorene	ND	ND	ND	ND	2,000	20	ND
4-chlorophenylphenylether	ND	ND	ND	ND	ND	ND	ND
diethyl phthalate	ND	ND	ND	ND	ND	ND	ND
1,2-diphenylhydrazine	ND	ND	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND
4-bromophenylphenylether	ND	ND	ND	ND	ND	ND	ND
hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND
phenanthrene	ND	ND	ND	10	3,000	40	ND
anthracene	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	ND	ND	ND	ND	ND	20	ND
fluoranthene	ND	ND	ND	20	ND	ND	ND
pyrene	ND	ND	ND	20	ND	10	ND
benzidine	ND	ND	ND	ND	ND	ND	ND
butylbenzylphthalate	ND	ND	ND	ND	ND	ND	ND
benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND
chrysene	ND	ND	ND	ND	ND	ND	ND
3,3'-dichlorobenzidine	ND	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	ND	ND	10	ND	ND	20	ND
di-n-octylphthalate	ND	ND	ND	ND	ND	ND	ND
benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND
benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND
benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND
ideno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND
dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND
benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND

Table 14. Semi-Volatile Organic Compound Concentrations in Groundwater, June 1987. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1S	MW-1D	MW-2SR	MW-4	MW-5R	MW-6	MW-7
<i>Acid Extractables</i>							
2-chlorophenol	ND	ND	ND	ND	ND	ND	ND
phenol	ND	ND	ND	ND	ND	ND	ND
2-nitrophenol	ND	ND	ND	ND	ND	ND	ND
2,4-dimethylphenol	ND	ND	ND	ND	ND	ND	ND
2,4-dichlorophenol	ND	ND	ND	ND	ND	ND	ND
4-chloro-3-methylphenol	ND	ND	ND	ND	ND	ND	ND
2,4,6-trichlorophenol	ND	ND	ND	ND	ND	ND	ND
2,4-dinitrophenol	ND	ND	ND	ND	ND	ND	ND
4-nitrophenol	ND	ND	ND	ND	ND	ND	ND
4,6-dinitro-2-methylphenol	ND	ND	ND	ND	ND	ND	ND
pentochlorophenol	ND	ND	ND	ND	ND	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

MW-5R and MW-7 samples were grab samples of oil/water mixture.

Table 15. Semi-Volatile Organic Compound Concentrations in Groundwater, October 1991. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-6R	MW-7R	MW-8
<i>Base-Neutral Extractables</i>										
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-chloroethyl)ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis (2-chloroisopropyl) ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
hexachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
nitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
isophorone	ND	ND	ND	ND	ND	ND	ND	15	ND	ND
bis(2-chloroethoxy)methane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
naphthalene	ND	ND	ND	ND	ND	ND	91	ND	ND	ND
hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-chloronaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
dimethyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acenaphthene	ND	ND	ND	ND	ND	ND	ND	13	ND	ND
2,4-dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
fluorene	ND	ND	ND	ND	ND	ND	150	20	ND	ND
4-chlorophenylphenylether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
diethyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-diphenylhydrazine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	ND	ND	ND	ND	ND	ND	140	21	ND	ND
4-bromophenylphenylether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenanthrene	ND	ND	ND	ND	ND	ND	240	31	ND	ND
anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
di-n-butylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
fluoranthene	14	ND	ND	ND	ND	ND	ND	ND	ND	ND
pyrene	10	ND	ND	ND	ND	ND	120	12	ND	ND
benzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
butylbenzylphthalate	ND	ND	ND	ND	ND	ND	170	ND	ND	ND
benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3,3'-dichlorobenzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	11	ND	ND	ND	12	ND	340	ND	ND	ND
di-n-octylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ideno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 15. Semi-Volatile Organic Compound Concentrations in Groundwater, October 1991. Penn Steel Area.
Kimberly-Clark, Chester, PA.

Semivolatile Organic Compounds	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-6R	MW-7R	MW-8
<i>Acid Extractables</i>										
2-chlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-nitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-dichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-chloro-3-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-trichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-dinitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-nitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,6-dinitro-2-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pentochlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Triegel & Associates, Inc.

MW-5RR sample was grab sample of oil/water mixture.

Table 16. Semi-Volatile Organic Compound Concentrations in Groundwater, December 1998. Penn Steel Area. Chester, PA.

Polynuclear Aromatic Hydrocarbons	MW-1SR	MW-1DR	MW-2SRR	MW-2DR	MW-3R	MW-4	MW-5RR	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Pyrene	6.2	7.6	<2	<2	<2	<2	<2	32	<2	18	<2	6.5	<2
Chrysene	<2	<2	<2	<2	<2	<2	<2	2.3	<2	2.7	<2	<2	<2
Phenanthrene	<2	<2	<2	<2	<2	<2	<2	25	<2	24	<2	<2	<2
Fluorene	<2	<2	<2	<2	<2	<2	<2	30	<2	25	<2	<2	<2
Benzo(a)anthracene	<2	<2	<2	<2	<2	<2	<2	2.8	<2	<2	<2	<2	<2
Benzo(b)fluoranthene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzo(a)pyrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Indeno(1,2,3-cd)pyrene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzo(g,h,i)perylene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

Concentrations in micrograms per liter (ug/l).

ND = Not detected above the method detection limit.

Data provided by Roux Associates, Inc.

MW-10 sample was grab samples of static water beneath sheen of separate-phase product.

Table 17. Laboratory Results for the Analyses of Groundwater Samples, MW-8. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	6.2
Toluene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	2.1
Ethylbenzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Naphthalene	NS	NS	16	<10.	10	NS	<20.0	7.4
Isopropylbenzene	NS	NS	2.9	1.1	3.0	NS	3.0	7.5
Fluorene	NS	NS	14	13	15	NS	20	17
Phenanthrene	NS	NS	<9.0	<10	<10	NS	13	10
Pyrene	NS	NS	13	<10	<10	NS	16	11
Chrysene	NS	NS	<9.0	<10	<10	NS	<9.0	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

NS=Not sampled.

Table 18. Laboratory Results for the Analyses of Groundwater Samples, MW-10. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Toluene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Ethylbenzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Naphthalene	NS	NS	6.7	<5.0	5.1	NS	<5.0	<5.0
Isopropylbenzene	NS	NS	4.8	3.4	3.1	NS	3.5	3.3
Fluorene	NS	NS	27	13	26	NS	<48	20
Phenanthrene	NS	NS	25	<10	23	NS	<48	17
Pyrene	NS	NS	17	<10	14	NS	<48	10
Chrysene	NS	NS	<10	<10	<10	NS	<48	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

NS=Not sampled.

Table 19. Laboratory Results for the Analyses of Groundwater Samples, MW-1SR. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0	<5.0
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	<10	<9.0	<9.0	<10	<9.0	11	<9.0	<9.0
Phenanthrene	<10	<9.0	<9.0	<10	<9.0	<9.0	<9.0	<9.0
Pyrene	NA	<9.0	9	<10	<9.0	44	<9.0	<9.0
Chrysene	NA	<9.0	<9.0	<10	<9.0	10	<9.0	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

Table 20. Laboratory Results for the Analyses of Groundwater Samples, MW-2SRR. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	5.3	<5.0	<5.0
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	<9.0	<9.0	<10	<9.0	<9.0	<9.0	<9.0	<10
Phenanthrene	<9.0	<9.0	<10	<9.0	<9.0	<9.0	<9.0	<10
Pyrene	NA	<9.0	<10	<9.0	<9.0	<9.0	<9.0	<10
Chrysene	NA	<9.0	<10	<9.0	<9.0	<9.0	<9.0	<10

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

Table 21 Laboratory Results for the Analyses of Groundwater Samples, MW-4. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	<10	<9.0	<10	<9.0	<9.0	<9.0	<10	<9.0
Phenanthrene	<10	<9.0	<10	<9.0	<9.0	<9.0	<10	<9.0
Pyrene	NA	<9.0	<10	<9.0	<9.0	<9.0	<10	<9.0
Chrysene	NA	<9.0	<10	<9.0	<9.0	<9.0	<10	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

Table 22. Laboratory Results for the Analyses of Groundwater Samples, MW-11. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	<10	<9.0	<9.0	<11	<10	<9.0	<9.0	<9.0
Phenanthrene	<10	<9.0	<9.0	<11	<10	<9.0	<9.0	<9.0
Pyrene	NA	<9.0	<9.0	<11	<10	<9.0	<9.0	<9.0
Chrysene	NA	<9.0	<9.0	<11	<10	<9.0	<9.0	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

Table 23. Laboratory Results for the Analyses of Groundwater Samples, MW-12. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	<9.0	<9.0	<10	<9.0	<10	<9.0	<9.0	<9.0
Phenanthrene	<9.0	<9.0	<10	<9.0	<10	<9.0	<9.0	<9.0
Pyrene	NA	<9.0	<10	<9.0	<10	<9.0	<9.0	<9.0
Chrysene	NA	<9.0	<10	<9.0	<10	<9.0	<9.0	<9.0

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

Table 24. Laboratory Results for the Analyses of Groundwater Samples, MW-13. Penn Steel Area. Kimberly Clark, Chester, Pennsylvania.

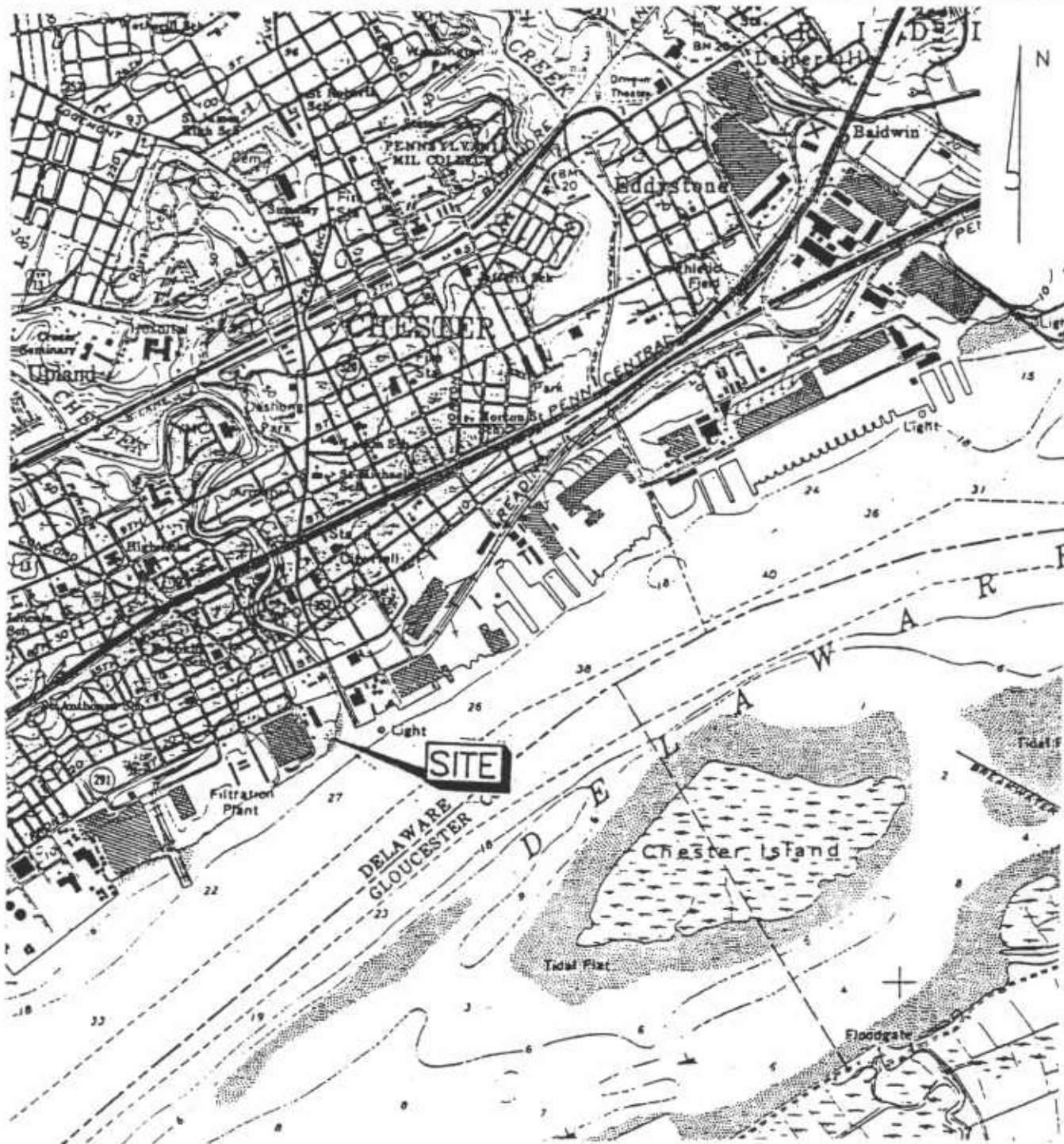
Parameter	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Jan-01	Mar-01	May-01
Benzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Toluene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Ethylbenzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Naphthalene	NS	NS	<5.0	<5.0	<5	NS	<5.0	<5.0
Isopropylbenzene	NS	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0
Fluorene	NS	NS	<9.0	<9.0	<10	NS	<10	<10
Phenanthrene	NS	NS	<9.0	<9.0	<10	NS	<10	<10
Pyrene	NS	NS	<9.0	<9.0	<10	NS	<10	<10
Chrysene	NS	NS	<9.0	<9.0	<10	NS	<10	<10

Parameter list from Act 2 Petroleum Shortlist for Fuel Oils No. 2, 4, 5, and 6.

Results reported in micrograms per liter (ug/l).

NA=Not analyzed.

NS=Not sampled.



BRIDGEPORT, NEW JERSEY
7.5 MINUTE QUADRANGLE
DELAWARE COUNTY, PA

FIGURE 1
Site Location Map
Kimberly-Clark
Front & Avenue of the States
Chester, Pennsylvania

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ENVIRONMENTAL CONSULTING
SERVICES, L.L.C.

SCALE 1:24,000

PROJECT NUMBER: P4024

REVIEWED BY: SCH DATE: 3/24/99



ZONED INDUSTRIAL (M-2)

FRONT STREET

CHESTER CREEK

KIMBERLY-CLARK
MAIN FACILITY

LAND LEASED
FROM CITY OF
CHESTER

COAL
STORAGE
AND
HANDLING

TRACTOR
TRAILER
PARKING

CONCRETE
SEDIMENT TRAP
AND SEPARATOR

LEGEND

- MW-12 MONITORING WELL LOCATION AND IDENTIFICATION
- FENCE LINE
- - - EDGE OF PAVING
- +—+— RAILROAD TRACKS
- [Hatched Box] AREA OWNED BY CITY OF CHESTER

NOTE:
MODIFIED AND REPRODUCED FROM VARGO
ASSOCIATES SITE SURVEY DATED 8/18/98.

ZONED INDUSTRIAL (M-3)

DELAWARE RIVER

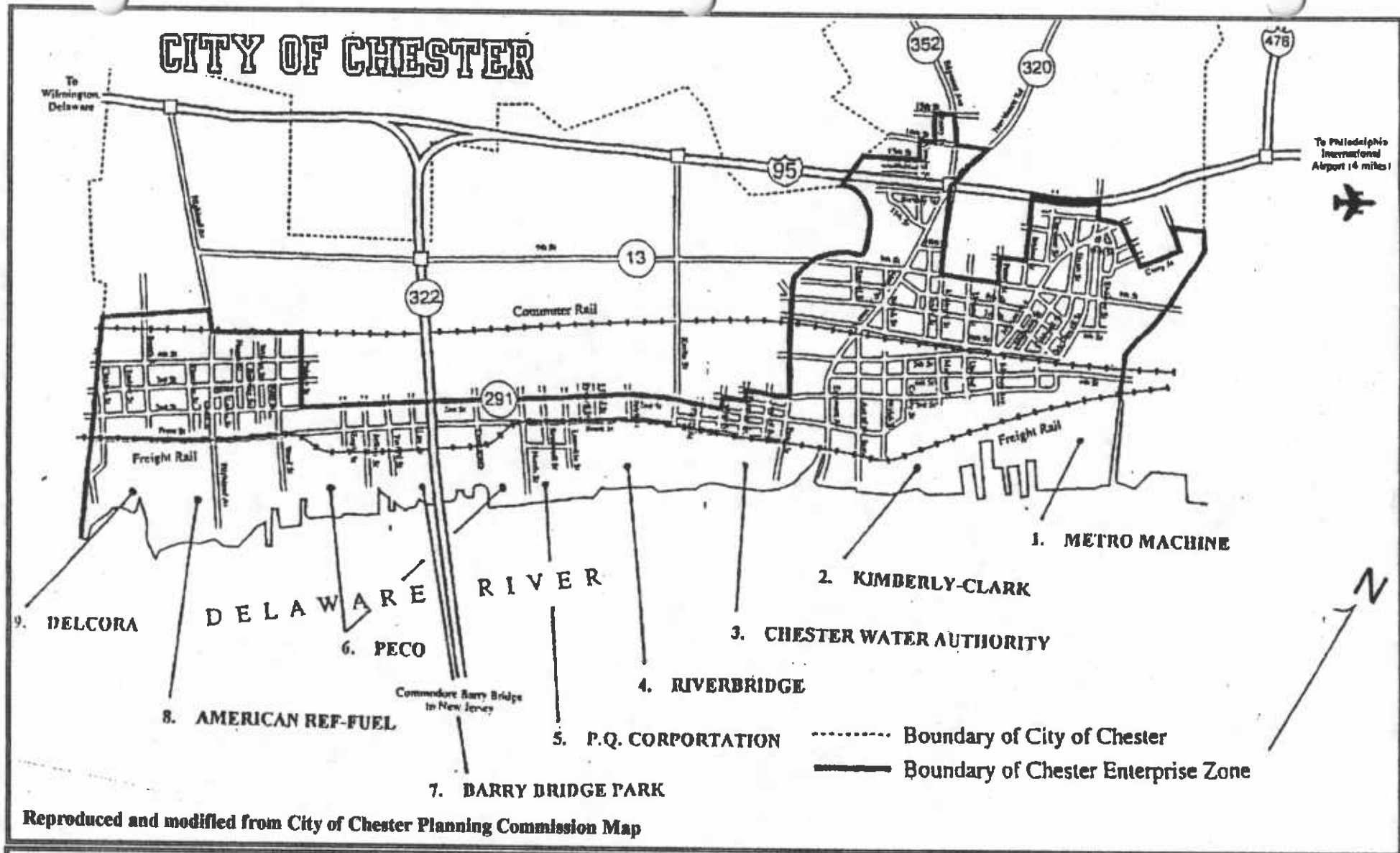


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SERVICES, L.L.C.

KIMBERLEY-CLARK
CHESTER, PENNSYLVANIA

PENN STEEL AREA
SITE MAP

DESIGNED BY SC	DRAWN BY CC	DATE AUGUST 01	PROJECT NO. 10027.05	FILE NAME 2801\2
CHECKED BY TH	PROJECT MGR. SC	SCALE GRAPHIC	DRAWING NO. -	FIGURE 2



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KIMBERLY-CLARK, Chester, NJ

VICINITY MAP SHOWING SURROUNDING INDUSTRY

PROJECT MANAGER:
TRH

DESIGNED BY:
TRH

DRAWN BY:
CC

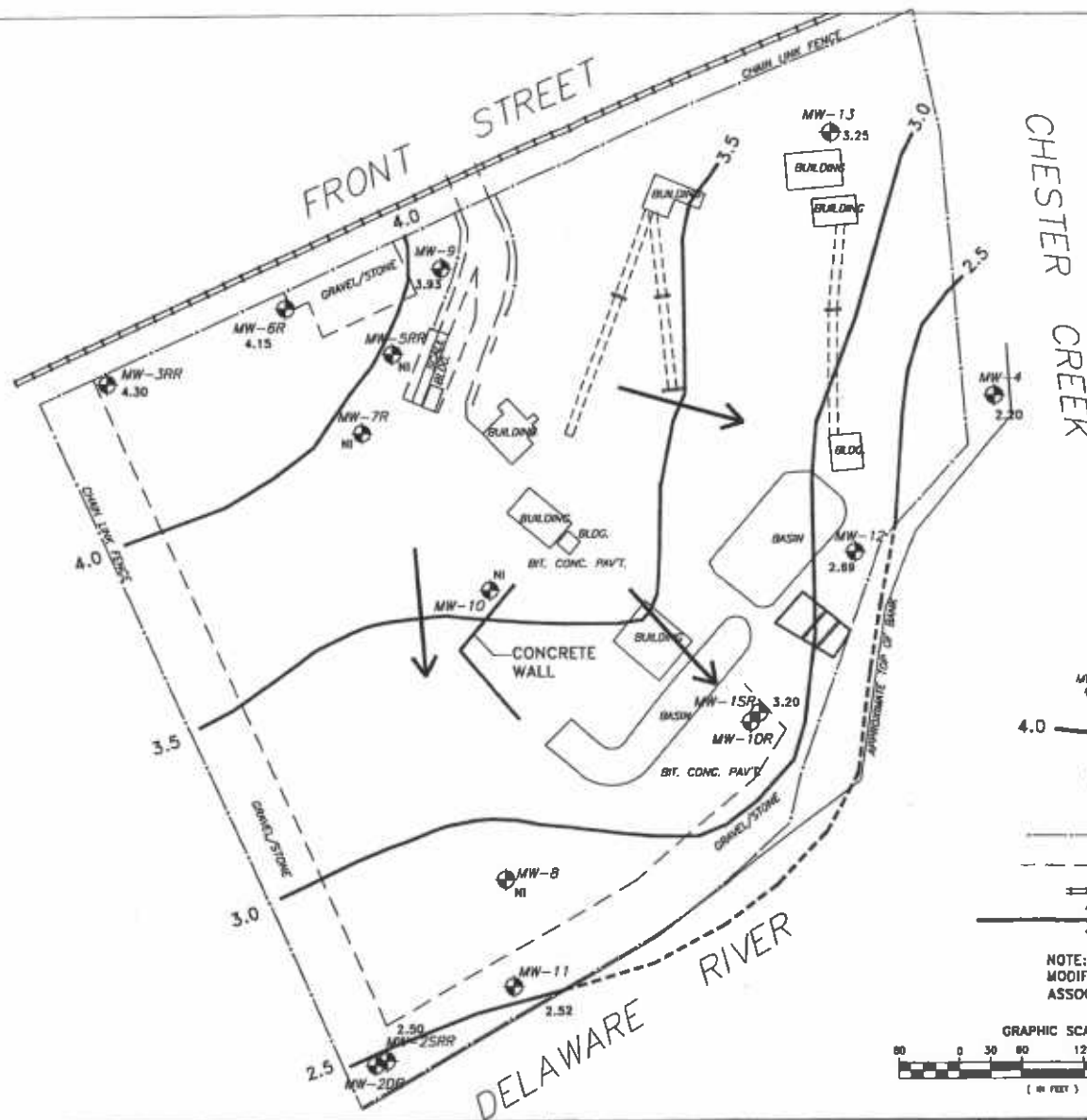
CHECKED BY:
TRH

SCALE:
NONE

DATE:
3/24/99

PROJECT No.
P4024

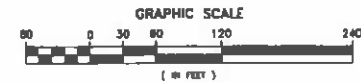
FIGURE 3



LEGEND

- MW-12 2.69 MONITORING WELL LOCATION AND IDENTIFICATION WITH GROUNDWATER ELEVATION
- 4.0 EQUIPOTENTIAL LINE IN FEET ABOVE SEA LEVEL (DASHED WHERE INFERRED)
- NI NOT INCLUDED DUE TO WELL INTEGRITY AND/OR ANOMALOUS READING
- FENCE LINE
- EDGE OF PAVING
- RAILROAD TRACKS
- GROUNDWATER FLOW DIRECTION

NOTE:
MODIFIED AND REPRODUCED FROM VARGO
ASSOCIATES SITE SURVEY DATED 8/18/98.

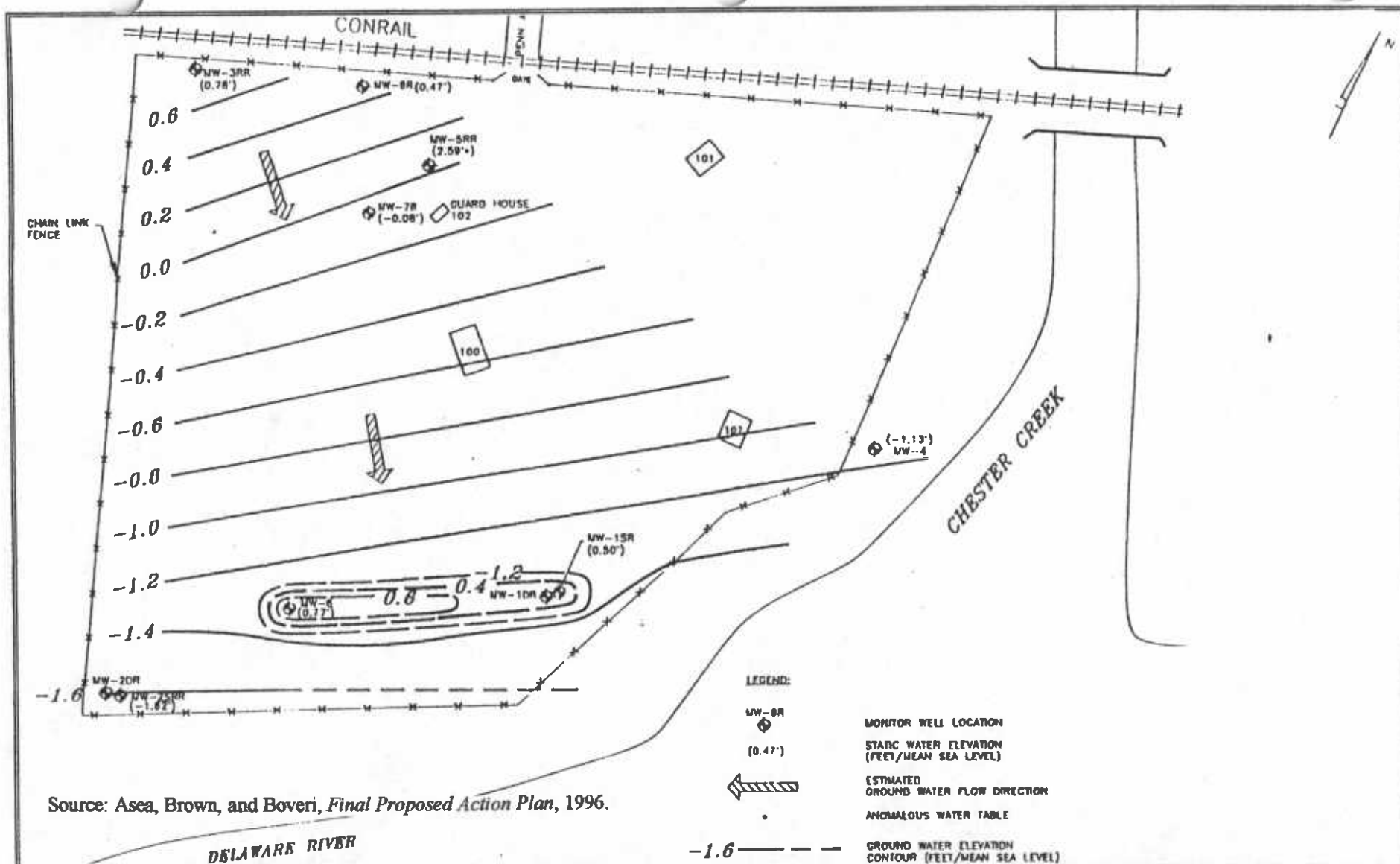


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SERVICES, L.L.C.

KIMBERLEY-CLARK
CHESTER, PENNSYLVANIA

GROUNDWATER ELEVATIONS
MAY 18, 2001

DESIGNED BY: SC	DRAWN BY: CC	DATE: AUGUST 01	PROJECT NO.: 10027.06	FILE NAME: 2801\2
CHECKED BY: TH	PROJECT MGR: SC	SCALE: GRAPHIC	DRAWING NO.: -	FIGURE: 4



ATLANTIC

ENVIRONMENTAL CONSULTING SERVICES, L.L.C.

KIMBERLY-CLARK; Chester, PA

HISTORICAL GROUNDWATER FLOW MAP
OCTOBER 1991

PROJECT MANAGER:
SHC

DESIGNED BY:
SHC

DRAWN BY:
CC

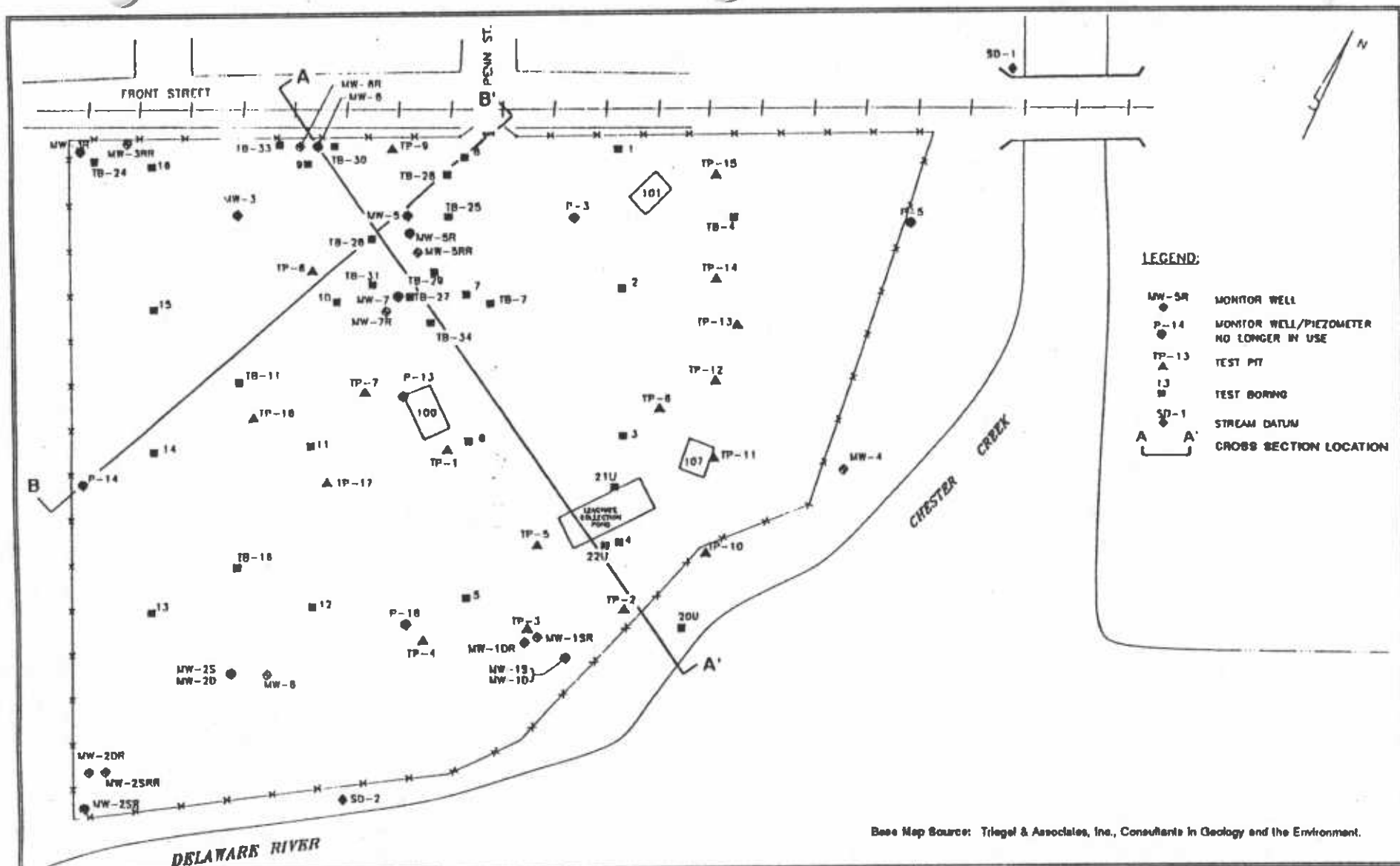
CHECKED BY:
TRH

SCALE:
NONE

DATE:
1/20/99

PROJECT No.
P4015

FIGURE
5



ATLANTIC

ENVIRONMENTAL CONSULTING SERVICES, L.L.C.

KIMBERLY-CLARK; Chester, PA

HISTORICAL MONITORING WELL, SOIL BORING AND TEST PIT LOCATIONS

PROJECT MANAGER:
SHC

DESIGNED BY:
SHC

DRAWN BY:
CC

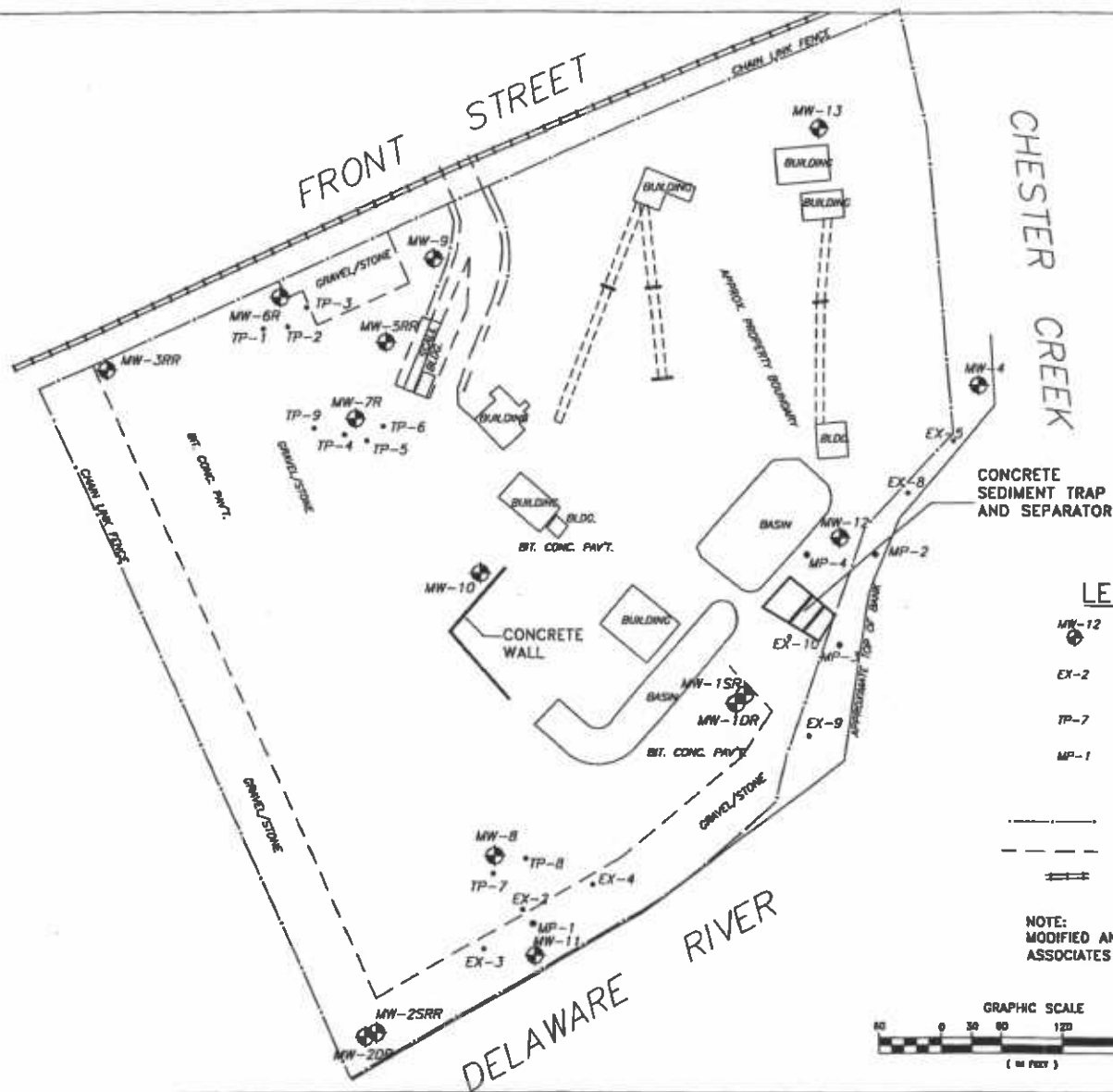
CHECKED BY:
TRH

SCALE:
NONE

DATE:
1/20/99

PROJECT No.
P4015

FIGURE 6

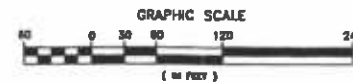


LEGEND

- MW-12 MONITORING WELL LOCATION AND IDENTIFICATION
- EX-2 TEST PIT EXCAVATION LOCATION IDENTIFICATION
- TP-7 TEMPORARY PIEZOMETER LOCATION AND IDENTIFICATION
- MP-1 MONITORING POINT LOCATION AND IDENTIFICATION

- FENCE LINE
- - - EDGE OF PAVING
- ||| RAILROAD TRACKS

NOTE:
MODIFIED AND REPRODUCED FROM VARGO
ASSOCIATES SITE SURVEY DATED 8/18/98.

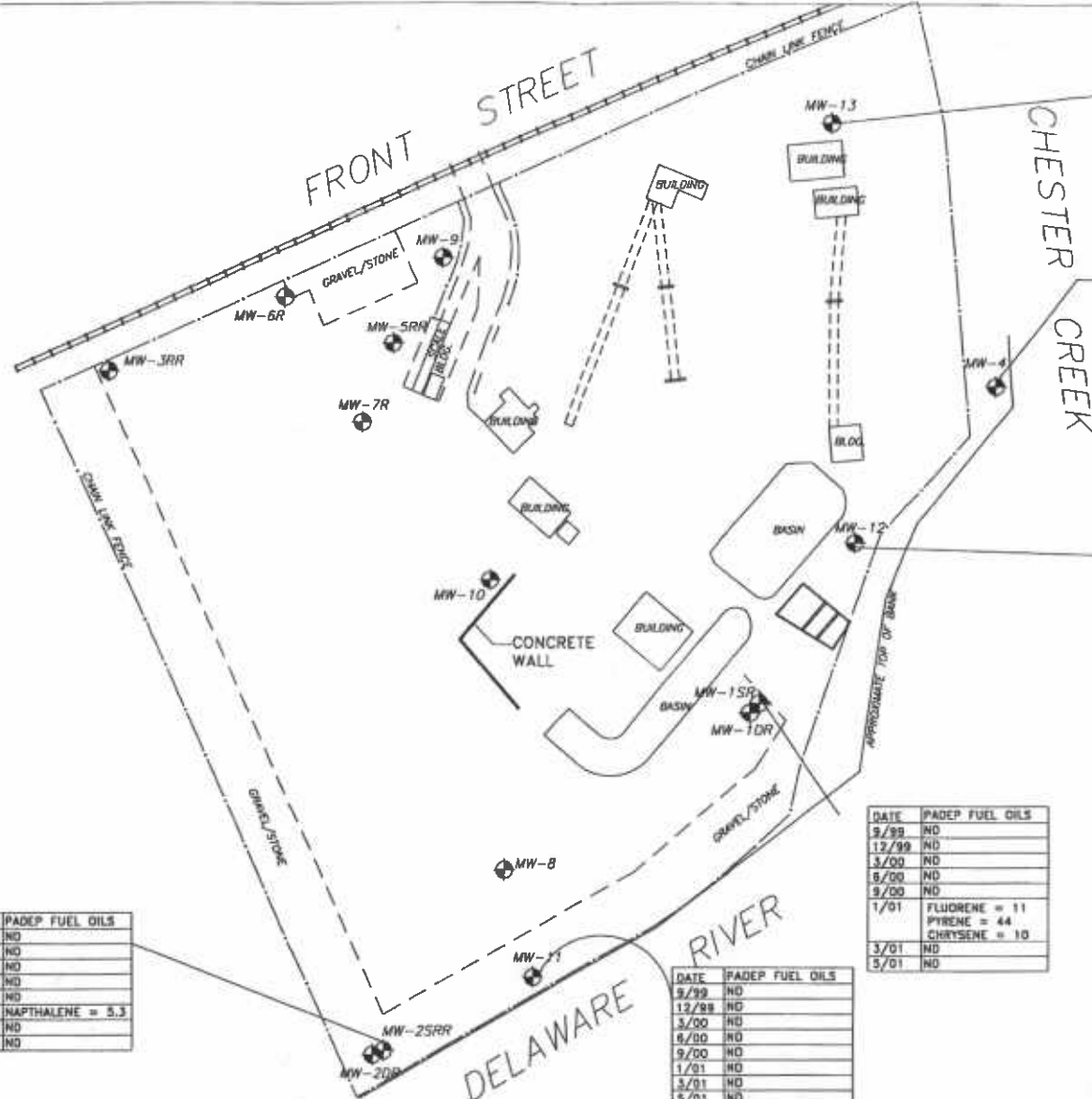


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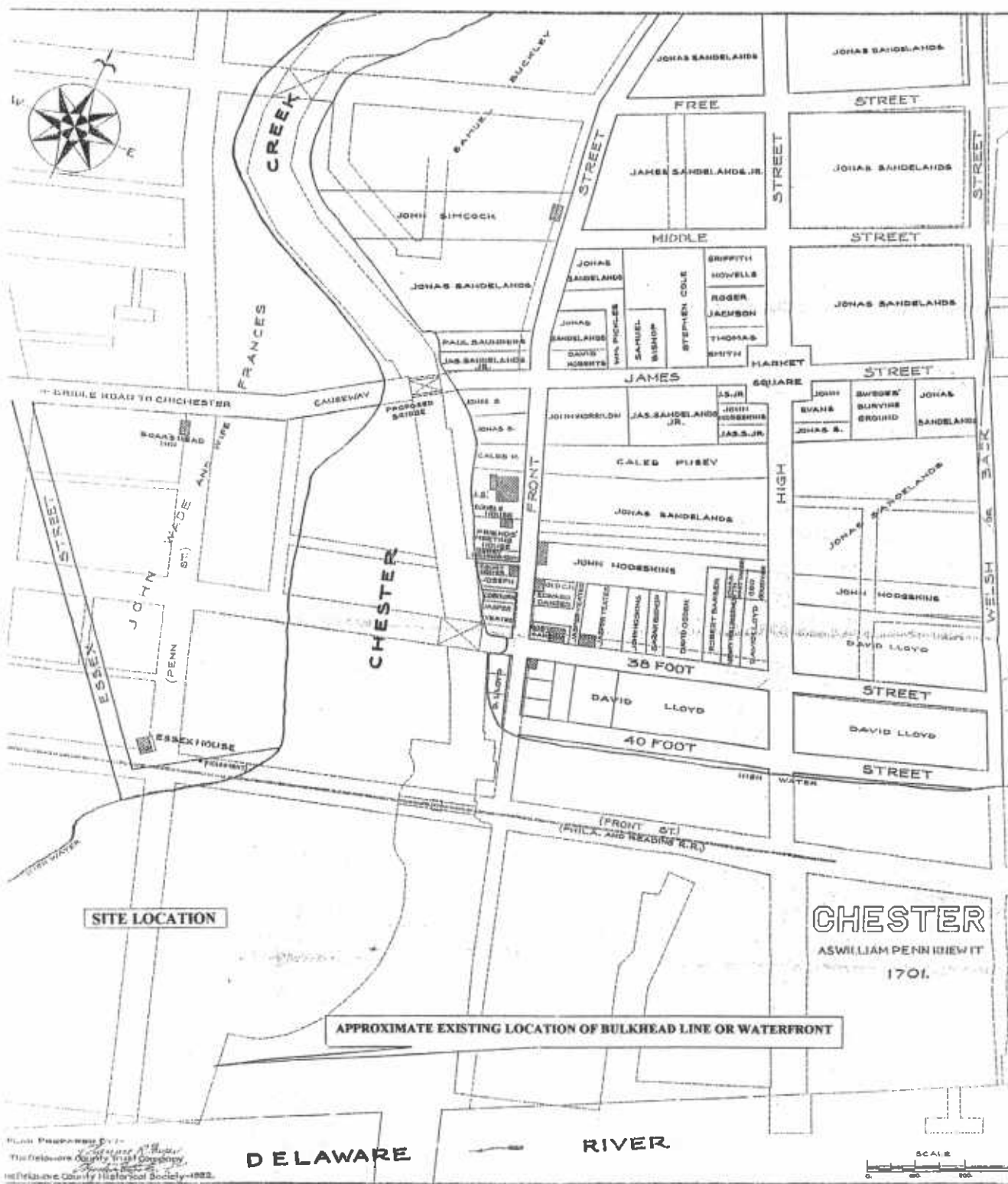
KIMBERLEY-CLARK
CHESTER, PENNSYLVANIA

RESIDUAL SEPARATE-PHASE
PRODUCT INVESTIGATION POINTS
PENN STEEL AREA

DESIGNED BY SC	DRAWN BY CC	DATE AUGUST 01	PROJECT NO. 10027.06	FILE NAME 2801\2
CHECKED BY TH	PROJECT MGR SC	SCALE GRAPHIC	DRAWING NO. -	FIGURE 7

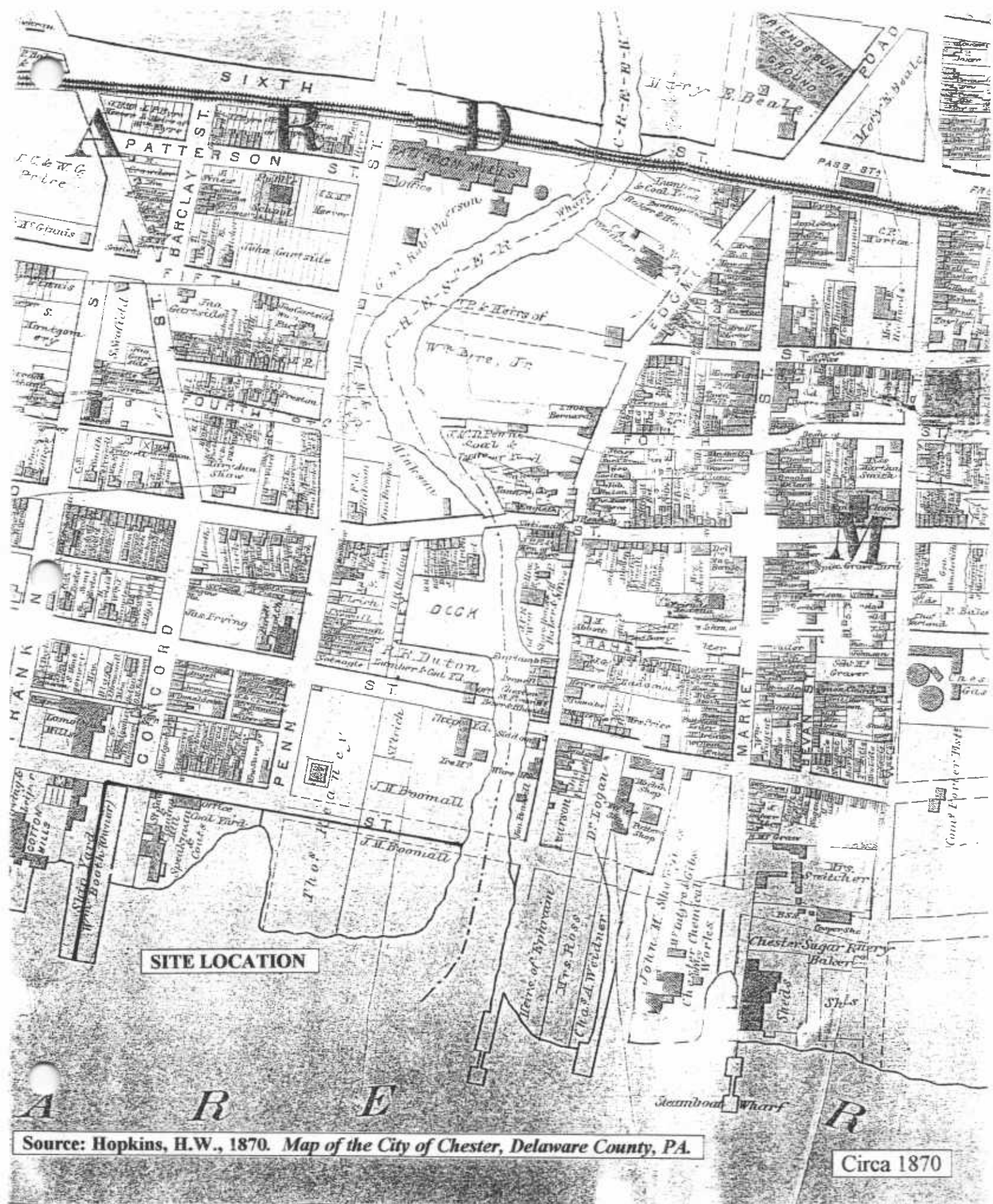


APPENDIX A
Historical Site Maps and Plans

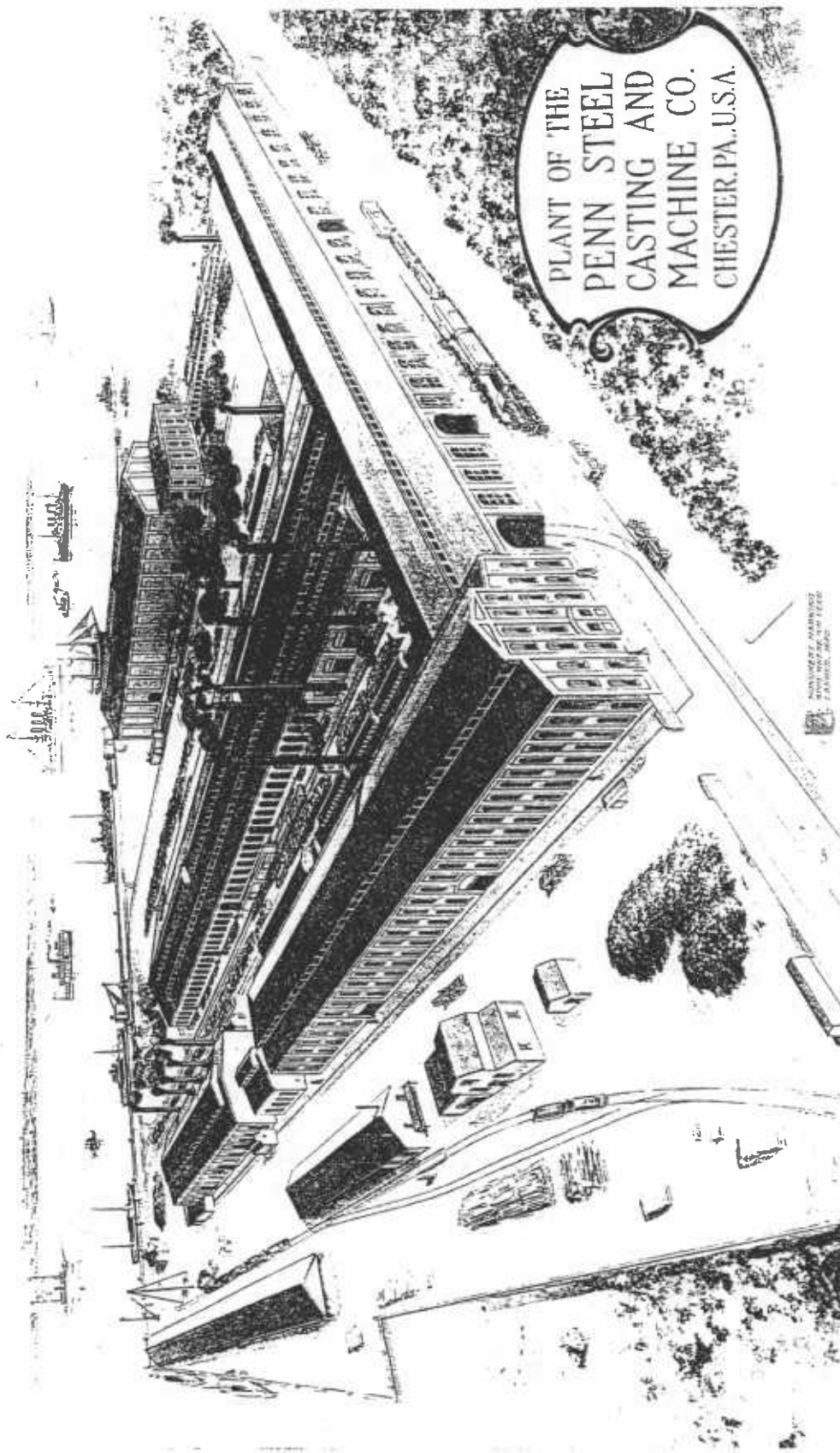


Map Prepared by:
The Delaware County Trust Company
in Delaware County Historical Society-1932.

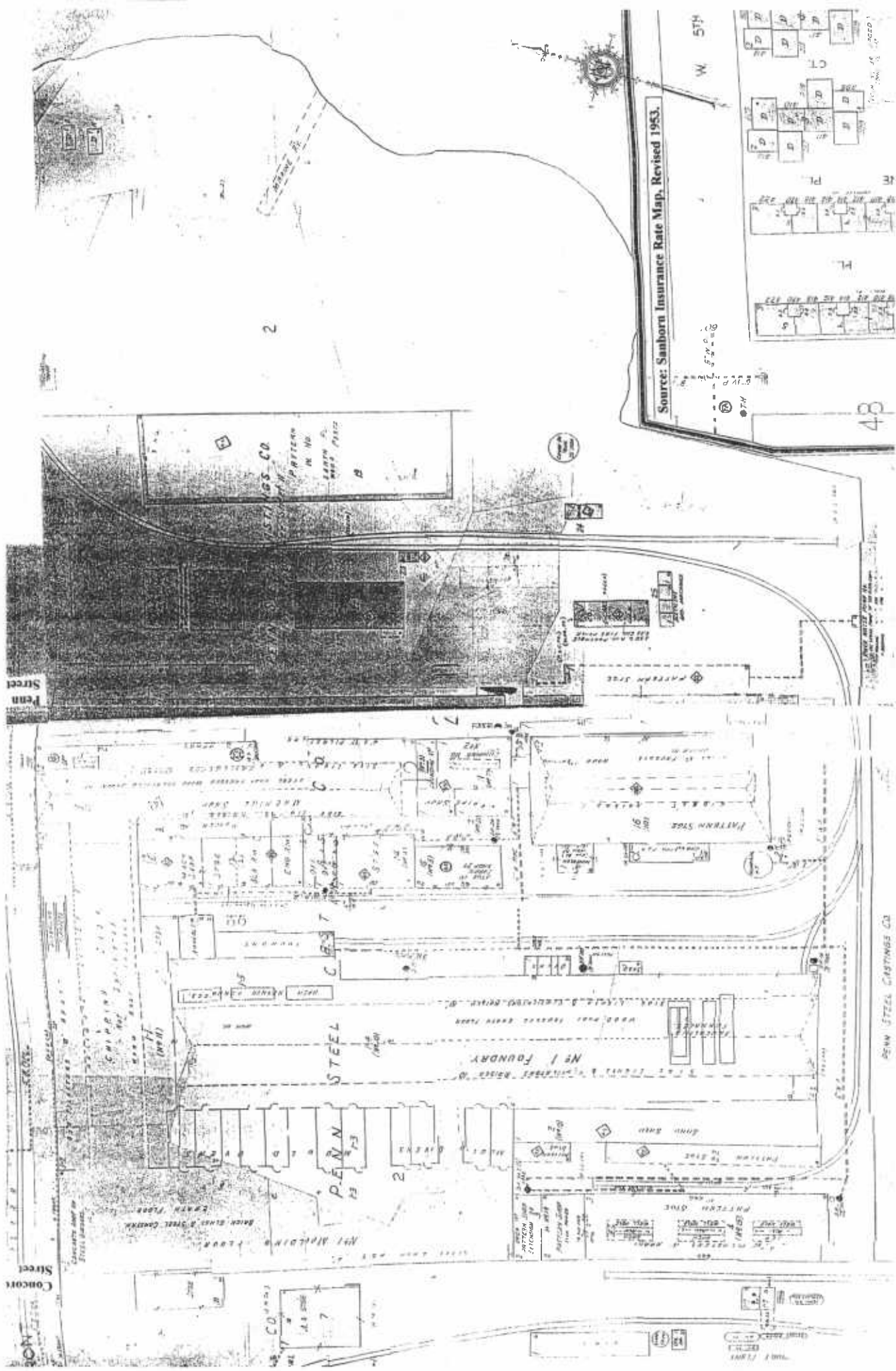
Source: Fryer, C.R., 1932, *Chester as William Penn Knew It, 1701.*



Site East of Penn Street Showing Structures on Marsh Area Filled Between 1898 and 1917.



Source: Green, J.E., 1913 (Pictorial Artist). *Penn Steel Casting and Machine Company, Southwest Corner of Front and Penn Streets, Chester, PA.*



Source: Sanborn Insurance Rate Map, Revised 1963.

APPENDIX B

Historical Aerial Photographs



**SITE
LOCATION**

NOT TO SCALE

Source: Farm Service Agency Map Collection. Chester and Delaware Counties, PA District Office.

Year:
1980



SITE
LOCATION

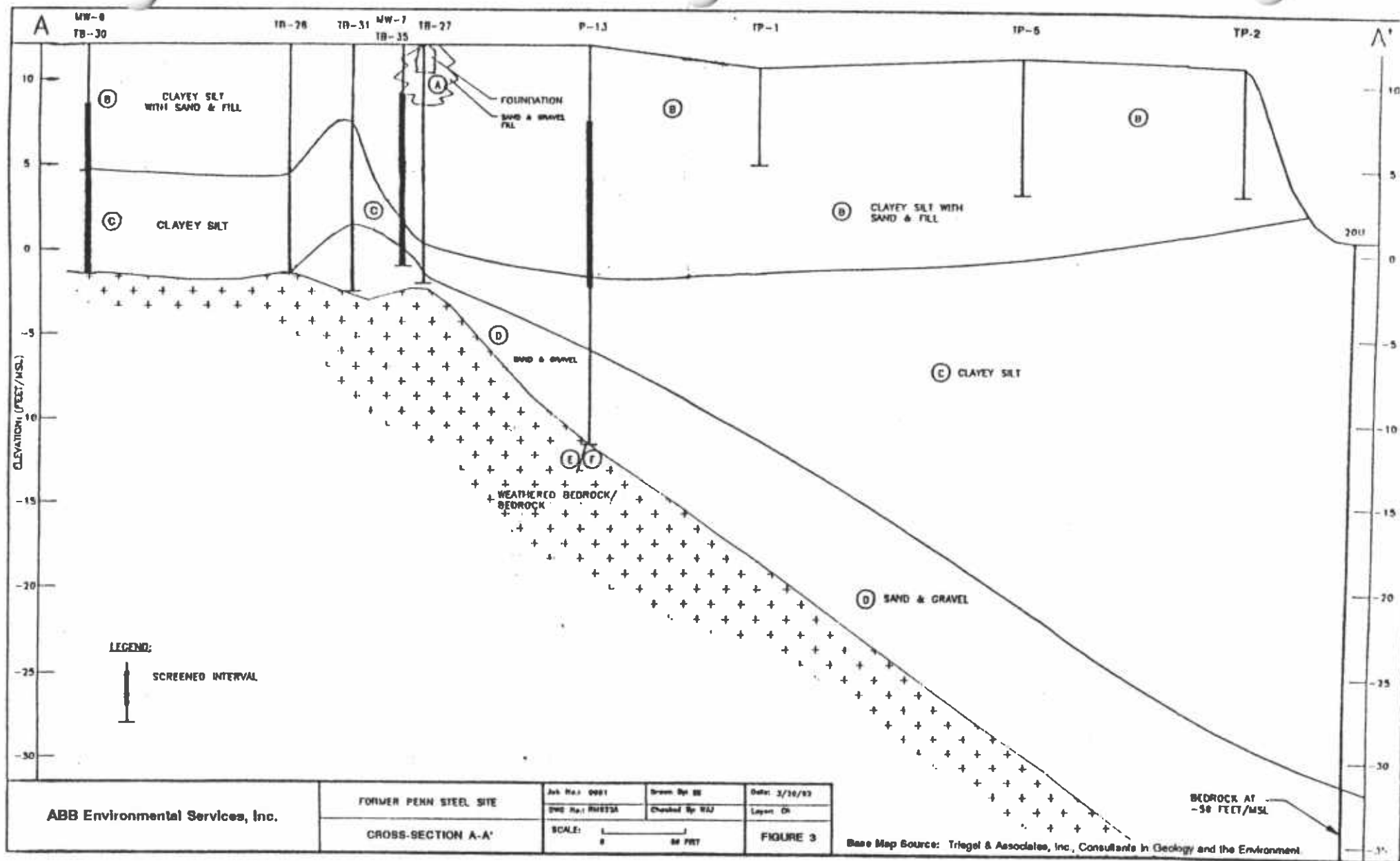
NOT TO SCALE

Source: Farm Service Agency Map Collection. Chester and Delaware Counties, PA District Office.

Year:
1992

APPENDIX C

**Geologic Cross Sections
Malcolm Pirnie and Triegel & Associates, Inc.**



Line Map Source: Triegel & Associates, Inc., Consultants in Geology and the Environment.

ABB Environmental Services, Inc.

CROSS-SECTION B-B'

FORMER PENN STEEL SITE

SCALE

50 FEET

FIGURE 4

Date: 3/18/93

As Noted

Drawn By: SS

Checked By: SLJ

Layer: 01

LEGEND
SCREENED
INTERVAL

